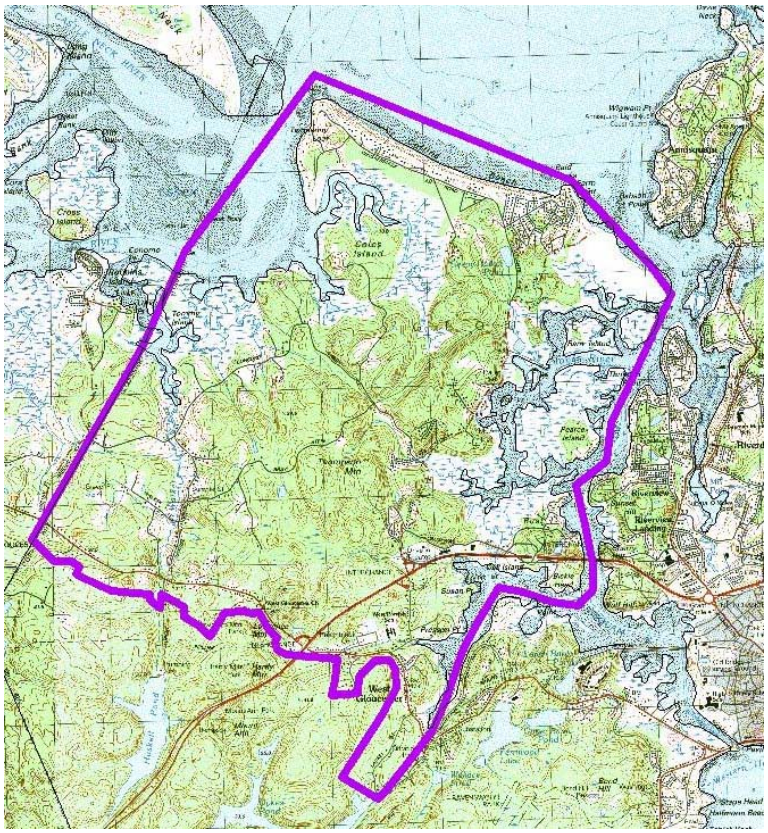
West Gloucester Land Use and Wastewater Plan



Ward 5-2 Section – Final Report

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1. Introduction and Executive Summary

The West Gloucester Land Use and Wastewater Plan is an effort to solve existing water quality and wastewater disposal problems in West Gloucester while at the same time planning proactively for the neighborhood's future. This report focuses on the Ward 5-2 section of West Gloucester.[1] The immediate need for this project is based on the City of Gloucester's recent decision to sell some of its excess sewer capacity to the Town of Essex. As a result of this agreement, a new sewer line is planned along Essex Avenue (Route 133).

In many ways, this proposed sewer line presents Ward 5-2 with an opportunity: an opportunity to correct longstanding water quality and wastewater treatment problems in the area and to attract desired forms of development that may require sewer service. On the other hand, the sewer may allow development to occur on lands that were previously undevelopable, resulting in runaway growth in a neighborhood that values its open space and rural character. The project, therefore, is an attempt to harness the proposed sewer extension as a force for positive change in Ward 5-2.

In addition to the immediate need for this study created by the imminent construction of the Essex Avenue sewer line, there is an additional need resulting from more gradual changes within the area. Over time, new development in the area has consumed open space, generated additional traffic and public school students, and gradually altered the character of some sections of Ward 5-2. While development *per se* can be either positive or negative, many area residents feel that unplanned growth in Ward 5-2 is likely to reduce the area's natural resources, aesthetic qualities, character, and affordability. Therefore, the project will also create a long-term plan to guide future growth, development, and conservation in the study area.

1.1 Goals of this Study

The specific goals of this study are to:

- Conduct a public participation process that allows Ward 5-2 residents to provide input on their goals and priorities for wastewater management and land use planning in the area;
- Examine existing conditions and factors in Ward 5-2 that are relevant to wastewater planning;
- Examine various wastewater management systems and their potential effect on growth and development in Ward 5-2, and integrate these factors into the wastewater management plan;

[1] The City has considered conducting a similar planning process for other sections of West Gloucester, and may do so in the future. Accordingly, this report focusing on Ward 5-2 is one component of a potentially larger West Gloucester Land Use and Wastewater Plan encompassing a greater area of the City.

- Recommend which sections of the study area should be served by sewer extensions, which sections should be served by localized community wastewater systems, and which sections should continue to use on-site wastewater systems;
- Prepare a plan to guide the future development and conservation of land in Ward 5-2; and
- Develop short-term and long-term action plans that identify how the City should implement the Plan's recommendations.

This study complements, but does not duplicate, the work of Plan 2000, the City's new master plan that is expected to be completed in mid-2001. Whereas Plan 2000 is a broad and comprehensive set of goals, objectives, and recommendations for the entire City, this study focuses primarily on two issues—wastewater management and growth management—and on one geographic section of the City. In addition, this study focuses on specific recommendations and implementation actions and is therefore less of a vision statement and more of an action plan than Plan 2000. Plan 2000 is discussed further in Section 11.1.1.

1.2 Planning Process

The planning process for the West Gloucester Land Use and Wastewater Plan included a sequence of information gathering efforts, analysis, and recommendations. Initial public input was solicited at two meetings in November 2000 to define the community's goals and priorities that relate to wastewater management and growth management. (Summaries of these meetings are contained in Appendix A.) During the spring of 2001, the public was given the opportunity to comment on drafts of both the wastewater and land use components of the Plan. Two public comment periods, each lasting at least 30 days, were provided during the spring: one for the Interim Wastewater Report (presented on March 1, 2001 and released on March 9, 2001) and one for the Draft Report, which included land use recommendations (presented on April 17, 2001 and released on May 14, 2001).

Throughout the planning process, draft plans and other information, as well as an online public feedback form, were available on the project website. Overall, it is estimated that at least 15% of the Study Area's year-round adult population participated in the planning process. Approximately 50 residents attended each of the fall meetings; 150 residents attended each of the spring meetings; and several hundred users visited the project website and downloaded copies of the draft reports. In addition, approximately 70 written public comments were submitted during the process. (Copies of the written public comments are included in Appendix C, which is on file in the Community Development Department.) The public review and comment process was a very important part of this project, and resulted in several revisions to the draft plan before it was finalized.

To assist them in preparing this plan, the City retained Daylor Consulting Group, Inc. ("Daylor"), a multidisciplinary engineering, planning, and environmental sciences firm based in Braintree, MA. Daylor's role in the project was to lead the public participation process, evaluate existing conditions, and prepare recommendations related to wastewater management and land use planning. While this report presents numerous recommendations to the City based on public input as well as Daylor's analysis and professional judgment, the recommendations themselves do not have any authority as public policy. This report has been presented to the Mayor, the City Council, the Planning Board and various City departments to be implemented through established procedures.

1.3 Study Area

The study area is defined as the West Gloucester Interim Planning Overlay District, and is depicted on the cover and on all the maps in this report (Figures 1 through 10).[2] This District includes a large portion of Ward 5-2 in West Gloucester. The Ordinance that creates this district restricts private sewer connections as well as the subdivision of land into four or more lots within the district, for a period of five years from the enactment of the Ordinance on May 30, 2000.

The study area as defined by this District is bounded to the west by the Gloucester/Essex municipal boundary; to the north by Wingaersheek and Coffins Beach; and to the east by the Annisquam River, the Little River, and a line 200 feet to the southeast of Laurel Street. The southern boundary runs south of and generally parallel to Essex Avenue, approximately along the boundary between the R-2 and the R-2A zoning districts, and, further west, along the boundary between the R-3 and the R-RB zoning districts, including the spur roads that extend south off of Essex Avenue such as Laurel Street, New Way Lane, Lawrence Mountain Road, and portions of Forest Lane and Woodman Street. This area will be referred to as the "Study Area" throughout this report.

1.4 Organization of this Report

This report presents both the wastewater and land use recommendations, as well as the information and analysis that led to those recommendations. The report is divided into thirteen sections. The first section is this introduction and executive summary. Sections 2 through 7 present the wastewater analysis and recommendations. Sections 8 through 12 present the land use analysis and recommendations. Section 13 outlines an action plan for implementing the wastewater and land use recommendations.

[2] The base map for all of the figures in this report is the United States Geological Survey's Topographic Quadrangles. These maps show roads, buildings, water features, forest cover, and topography. The most recent USGS maps available for the Study Area (which were used for this project) date from 1982-1985. Several of the maps also include parcel boundaries, which were provided by the City of Gloucester and are current through the year 2000.

1.5 Summary of Wastewater Plan

The wastewater recommendations are based on the following factors:

- The location and distribution of known or suspected failing on-site wastewater systems.
- The location and extent of water quality problems that are being caused by failing wastewater systems.
- The potential for and the advantages and disadvantages of providing various types of wastewater treatment to each neighborhood. Wastewater treatment systems considered include sewer service (gravity and pressure), community septic systems (utilizing a range of technologies), and on-site septic systems (also utilizing a range of technologies).
- The potential of each of the wastewater treatment solutions for contributing to undesirable secondary growth impacts, as well as the potential to facilitate desired development.
- The effect of the City's current Private Sewer Rules and Regulations, which allow private sewer extensions throughout the City. If this policy remains unchanged, private parties could extend the sewer anywhere in the Study Area, resulting in significant secondary growth impacts as well as possible system capacity issues.
- Community input and preferences identified through the planning process.

The wastewater recommendations are shown in Figure 5, and include the following five wastewater treatment solutions:

City Sewer Service Area (City SSA): These areas are a high priority for sewering because they contain a concentration of known or suspected failing systems, contribute significantly to water quality problems, and/or are located adjacent to the proposed sewer main on Essex Avenue. City-installed public sewer service is recommended in these areas, and sewer connections and extensions should be allowed for both existing development and new development.

Private Sewer Service Area (Private SSA): These areas are a lower priority for sewering than the City SSA because they contain fewer known or suspected failing systems and contribute less to water quality problems. While these areas do not warrant City-installed sewer service, existing homeowners or groups of homeowners in the Private SSAs should be able to build private sewer extensions to service existing development, if they so choose.

Contingent City Sewer Service Area (Contingent City SSA): These areas are a high priority for centralized wastewater treatment service because they contain a concentration of

known or suspected failing systems and contribute to water quality problems. Providing that the Private Sewer Rules and Regulations are modified to disallow widespread private sewer extensions, wastewater treatment service in the Contingent City SSA should be sewer. However, if the Private Sewer Rules and Regulations remain as they are currently written, the potential growth impacts of sewering these areas would be large, and it is recommended that the City provide community wastewater systems for these areas.

Contingent Private Sewer Service Area (Contingent Private SSA): This area is a lower priority for sewering and does not warrant City-installed sewer service. However, private sewer extensions should be allowed in this area.

Individual On-Site System Area: These areas are a low priority for sewering because they are contain relatively few known or suspected failing systems, contribute little to water quality problems, are remote or sparsely developed, and/or would be a target for considerable development if they were sewered. Accordingly, private on-site septic systems are recommended for these areas. City or private sewer extensions should not be allowed in these areas.

1.6 Summary of Land Use Plan

In order to inform the land use planning process, Daylor prepared an analysis of existing land use, open space, wetlands and other regulated areas, and the growth potential within the Study Area under current zoning regulations. Based on public input and City goals identified during the planning process as well as Plan 2000 and the City's Open Space Plan, the land use plan was designed to promote the following goals and objectives:

- Direct new growth away from rural and environmentally sensitive areas.
- Protect additional high priority open space lands through a variety of mechanisms.
- Maintain the Study Area's existing character by promoting compatible development designs.
- Protect the area's natural resources by enforcing existing regulations and promoting environmentally sensitive development designs.
- Encourage and facilitate the maintenance of existing affordable housing and the construction of new affordable housing through a variety of mechanisms.
- Develop effective implementation tools that do not unduly burden existing landowners.

The land use recommendations focus on targeting new development into appropriate sewered areas while protecting open space in the rural, unsewered areas. This can be accomplish through "incentive zoning" which encourages developers to contribute to open space

protection in rural areas in exchange for building additional units in the sewered areas. The City should also develop a comprehensive open space protection program using several protection strategies.

Based on public input, desirable forms of development in the Study Area could include affordable housing, housing for senior citizens, and perhaps mixed-use development including a small retail component. The land use plan recommends a range of regulatory and incentive policies, as well as City and private sector initiatives, to allow these types of development to occur in a compatible manner.

Because residents highly value the Study Area's rural character, the City should consider several means of ensuring that new development is compatible with the existing neighborhood character, both environmentally and aesthetically. Potential tools include protections for steep slopes, stormwater management policies, revisions to the Subdivision Rules and Regulations, protection for scenic roads and corridors such as Essex Avenue, and building design guidelines for major projects. Policies that regulate the design of new development should be carefully structured to maximize their effect while minimizing the procedural burden placed on applicants and on the City boards, commissions and departments that administer these policies.

2. Existing Water and Wastewater Infrastructure

This section presents a summary of the existing wastewater treatment and water supply infrastructure within the Study Area. Information on existing wastewater treatment systems is essential for determining where the greatest concentrations of problems now occur and where functional on-site wastewater treatment systems are likely to be feasible in the future. Water supply is a potentially limiting factor for the future growth of Gloucester, and therefore it is important to understand the City's current water supply infrastructure.

2.1 Description of Existing Wastewater Infrastructure

The existing wastewater infrastructure in the Study Area is comprised of conventional septic systems, septic systems with advanced treatment, cesspools, and tight tanks. There are no sewer services or community wastewater treatment systems currently operating in the Study Area. Information regarding the type and status of the existing wastewater infrastructure was obtained from the City of Gloucester Health Department's database. This database was current as of September 2000, and provided the following information on each parcel within the Study Area:

- Is the parcel vacant or occupied?
- If the parcel has a building on it, what type of wastewater treatment system serves this building?
- What is the status of this wastewater treatment system (see below)?
- Has this wastewater treatment system had any problems, or been upgraded, in the past (since 1996, when the database information begins)?

The City has adopted a system to evaluate the status of existing on-site wastewater treatment infrastructure. The City requires system owners to have their systems pumped every 3½ years. At the time of the pumping, the pumper evaluates the condition of the system, fills out a Septic System Function Check Reporting Form, and submits it to the Board of Health. The checklist is formatted to evaluate septic systems, cesspools, and tight tanks for the following:

- Breakout or ponding (all systems)
- Condition of tank structure (all systems)
- Liquid level above the inlet invert (cesspools only)
- Liquid level above the outlet invert (all systems)
- Broken or missing tees (all systems)

If the pumper detects a violation of any of the above criteria, the Board of Health will order the owner to do a Title 5 inspection of the system. (See Section 4.1.1 for a discussion of Title 5 of the State Environmental Code.) This inspection must take place within 2 months of the function check. Alternatively, the homeowner may declare that their system is failed,

therefore avoiding the cost of the inspection. If the homeowner chooses to have the Title 5 inspection and the system fails, an upgrade is ordered and must take place within 2 years and 2 months of the failed function check.

According to the Board of Health, however, a system that passes the function check is not necessarily a functional system. For example, a homeowner whose system would not pass a Title 5 inspection may be able to pass a function check by intentionally ordering the system to be pumped during dry weather or by reducing wastewater flows just before the pump-out.

To evaluate the existing wastewater treatment infrastructure in the Study Area, each of the approximately 1,082 systems in the Study Area that have a record in the database were placed into one of the following categories, based on the information in the database:

1. **Known or Suspected Failed Systems**

   1a. Failed Title V Inspection: These systems have failed a Title 5 inspection and have not yet been upgraded or replaced to comply with Title 5. These systems are considered "known failed systems."

   1b. Failed Function Check: These systems have failed the function check administered by the pumper, but have not yet had a Title 5 inspection. These systems are considered "suspected failed systems."

   1c. Upgrade Ordered: These systems have not failed a Title 5 inspection, but either the homeowner has voluntary agreed to upgrade the system because of existing problems, or the Board of Health has ordered such an upgrade because of other evidence of a failure.

   1d: Tight Tanks: Although tight tanks may or may not be Title 5 compliant, the presence of a tight tank indicates that the property is most likely unsuitable for on-site sewage disposal. Therefore, these properties were considered to be in need of a suitable long-term wastewater disposal solution.

2. **Known Title 5 Compliant Systems**

   2a. Post-1996 Title 5 System: These systems were installed under the new Title 5 regulations, which went into effect in 1996, and are therefore Title 5 compliant. Many of these systems utilize advanced treatment technologies.

   2b: Pre-1996 System Passed Title 5: These systems were installed prior to the new Title 5 regulations taking effect, but have passed a Title 5 inspection. A Title 5 inspection may have been required because the property was sold or because the system was upgraded.

3. **No Data**

   Systems that do not fall into one of the above categories were considered to have an unknown status. Although most of these systems have passed a function check, this does

not mean that the system is necessarily functioning at an acceptable level, as was discussed above.

Overall, about 94 (9%) of the 1,082 systems in the Study Area are known or suspected failing systems, about 228 (21%) are Title 5 compliant systems, and about 760 (70%) have an unknown status. The number of systems within each of these categories and sub-categories was summarized by neighborhood in order to identify clusters of failed systems as well as areas with few or no failed systems. In addition, any proposed or approved septic plans in each area were noted because this information indicated whether the area contains pockets of pervious soils that are suitable for Title 5 compliant wastewater disposal. The summary by neighborhood is contained in Tables 2-1 through 2-32 and the accompanying narrative.

Because 70% of the systems within the Study Area were considered to have an unknown status based on information in the database alone, Daylor obtained other information such as soils data, lot size, visual inspections of properties within each of the neighborhoods, and written and verbal reports from the Board of Health and from property owners concerned about the condition of their system or their neighbor's system. The purpose of these investigations was to evaluate whether or not the conditions in each of the neighborhoods within the Study Area are generally conducive to Title 5 compliant wastewater disposal. For example, small lots with steep topography and many rock outcroppings were generally assumed to have little soil that is suitable for wastewater disposal. In addition, written public comments from residents following the completion of the Interim Wastewater Report identified some additional failing systems in certain areas that had not been previously identified from the database. (See Appendix C for copies of the public comment letters.)

Overall, it is believed that the information in the database combined with these supplementary investigations provides a very accurate assessment of the location and approximate quantity of failed systems in the Study Area. Based on this information, Daylor compiled a generalized map of existing wastewater treatment systems which identifies neighborhoods with a concentration of known or suspected failed systems and neighborhoods with scattered known or suspected failed systems (see Figure 1).[1] Areas which were not classified in either category may still have a few failed systems, but were generally determined to be better suited to on-site wastewater disposal because of larger lots, better soils, and/or newer systems.

[1] Because the numbers in Tables 2-1 through 2-32 reflect only the database data and not the supplemental information obtained by Daylor, they differ slightly from the information presented on the generalized map.

2.1.1 Essex Avenue

Approximately 151 developed lots abut Essex Avenue. Of these, approximately 22 systems (15%) have either failed a pump test, failed a Title 5 inspection, or are under order to upgrade. The failed and suspected failed systems are generally evenly distributed along Essex Avenue, except for a small cluster of problem systems just east of Route 128. Approximately 24 systems (16%), also fairly evenly distributed along Essex Avenue, are Title 5 compliant. The remaining 103 systems (69%) are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.1.

Table 2-1: Essex Avenue Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	103
Cesspools	36
Tight Tanks	2
Advanced Treatment Systems	1
Unrecorded/Unknown System Type	9
Total Systems	**151**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	12
Upgrade Ordered	10
Tight Tanks	2
Subtotal Known or Suspected Failures	**24**
Post-1996 Title 5 Systems	8
Pre-1996 Systems Passed Title 5	16
Subtotal Known Title 5 Compliant Systems	**24**
Non-Title 5 Inspected Systems	**103**
Total Systems	**151**

Area Summary:
16% Known or Suspected Failures
16% Known Compliant Systems

2.1.2 Laurel Street

Approximately 20 developed lots abut Laurel Street. Of these, two systems (10%) have either failed a pump test or a Title 5 inspection. These failed or suspected failed systems are generally located near the intersection of Essex Avenue. Nine systems (45%) are Title 5 compliant; these are generally evenly distributed along the remainder of Laurel Street. The remaining 9 systems (45%) are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. These systems are also distributed along the length of Laurel Avenue. The type and status of existing wastewater infrastructure in this area is shown in Table 2.2.

Table 2-2: Laurel Street Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	13
Cesspools	5
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	2
Total Systems	**20**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	2
Upgrade Ordered	0
Tight Tanks	0
Subtotal Known or Suspected Failures	**2**
Post-1996 Title 5 Systems	1
Pre-1996 Systems Passed Title 5	8
Subtotal Known Title 5 Compliant Systems	**9**
Non-Title 5 Inspected Systems	**9**
Total Systems	**20**

Area Summary:
10% Known or Suspected Failures
45% Known Compliant Systems

2.1.3 New Way Lane, Larose Avenue, and Mt. Ann Road

There are approximately 36 developed lots along New Way Lane, Larose Avenue, and Mt. Ann Road. Of these, one system has passed a Title 5 inspection, one system was installed after 1996, and one system is a tight tank. The tight tank and the system that passed Title 5 inspection are located at the end of Larose Avenue. The system installed after 1996 is located near Essex Avenue. The remaining 33 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.3.

Table 2-3: New Way Lane, Larose Avenue, and Mt. Ann Road Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	22
Cesspools	10
Tight Tanks	1
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	3
Total Systems	**36**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	0
Tight Tanks	1
Subtotal Known or Suspected Failures	**1**
Post-1996 Title 5 Systems	1
Pre-1996 Systems Passed Title 5	1
Subtotal Known Title 5 Compliant Systems	**2**
Non-Title 5 Inspected Systems	**33**
Total Systems	**36**

Area Summary:
3% Known or Suspected Failures
6% Known Compliant Systems

2.1.4 Lawrence Mountain Road

There are approximately 10 developed lots along Lawrence Mountain Road. Of these there is one system that was installed after 1996. The remaining 9 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.4.

Table 2-4: Lawrence Mountain Road Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	7
Cesspools	2
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	1
Total Systems	**10**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	0
Tight Tanks	0
Subtotal Known or Suspected Failures	**0**
Post-1996 Title 5 Systems	1
Pre-1996 Systems Passed Title 5	0
Subtotal Known Title 5 Compliant Systems	**1**
Non-Title 5 Inspected Systems	**9**
Total Systems	**10**

Area Summary:
0% Known or Suspected Failures
10% Known Compliant Systems

2.1.5 Forest Lane

There are approximately four developed lots along the portion of Forest Lane that is within the Study Area. All four systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.5.

Table 2-5: Forest Lane Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	2
Cesspools	2
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	0
Total Systems	**4**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	0
Tight Tanks	0
Subtotal Known or Suspected Failures	**0**
Post-1996 Title 5 Systems	0
Pre-1996 Systems Passed Title 5	0
Subtotal Known Title 5 Compliant Systems	**0**
Non-Title 5 Inspected Systems	**4**
Total Systems	**4**

Area Summary:
0% Known or Suspected Failures
0% Known Compliant Systems

2.1.6 Woodman Street

There are approximately five developed lots along the stretch of Woodman Street that is within the Study Area. One of the lots utilizes a tight tank, and one has passed a Title 5 inspection. The remaining three systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.6.

Table 2-6: Woodman Street Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	4
Cesspools	0
Tight Tanks	1
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	0
Total Systems	**5**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	0
Tight Tanks	1
Subtotal Known or Suspected Failures	**1**
Post-1996 Title 5 Systems	0
Pre-1996 Systems Passed Title 5	1
Subtotal Known Title 5 Compliant Systems	**1**
Non-Title 5 Inspected Systems	**3**
Total Systems	**5**

Area Summary:
20% Known or Suspected Failures
20% Known Compliant Systems

2.1.7 Whipple Woods Road and Andrews Court

There are approximately six developed lots along Whipple Woods Road and Andrews Court (note that some addresses on Andrews Court have frontage on Essex Avenue and were included in the Essex Avenue area). All six of the systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.7.

Table 2-7: Whipple Woods Road and Andrews Court Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	6
Cesspools	0
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	0
Total Systems	**6**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	0
Tight Tanks	0
Subtotal Known or Suspected Failures	**0**
Post-1996 Title 5 Systems	0
Pre-1996 Systems Passed Title 5	0
Subtotal Known Title 5 Compliant Systems	**0**
Non-Title 5 Inspected Systems	**6**
Total Systems	**6**

Area Summary:
0% Known or Suspected Failures
0% Known Compliant Systems

2.1.8 Lincoln Street/Keystone Road Area

The Lincoln Street/Keystone Road area includes Winterhaven Road and Mathieu Hill Road. Approximately 16 developed lots abut these roadways. Of these, one system along Lincoln Street has been ordered to upgrade. There are seven systems (44%), evenly distributed throughout the area, that are Title 5 compliant, three of which are new systems installed after 1996, and the remaining four of which are older systems that have passed a Title 5 inspection. The remaining eight systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.8.

Table 2.8 - Lincoln Street/Keystone Road Area Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	13
Cesspools	2
Tight Tanks	0
Advanced Treatment Systems	1
Unrecorded/Unknown System Type	0
Total Systems	**16**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	1
Tight Tanks	0
Subtotal Known or Suspected Failures	**1**
Post-1996 Title 5 Systems	3
Pre-1996 Systems Passed Title 5	4
Subtotal Known Title 5 Compliant Systems	**7**
Non-Title 5 Inspected Systems	**8**
Total Systems	**16**

Area Summary:
6% Known or Suspected Failures
44% Known Compliant Systems

2.1.9 Overlook Avenue

Approximately 18 developed lots abut this roadway. Of these, five are known or suspected failing systems. These systems are mostly located on the smaller lots that are clustered together on the west side of Overlook Avenue. There are three Title 5 compliant systems installed after 1996. Two of these systems are located on large lots where Overlook Avenue becomes a paper street. The third system is an advanced treatment system that is located on a smaller lot. Two pre-1996 septic systems have also passed a Title 5 inspection. The remaining eight systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. These systems are generally evenly distributed along the length of Overlook Avenue. The type and status of existing wastewater infrastructure in this area is shown in Table 2.9.

Table 2-9: Overlook Avenue Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	7
Cesspools	8
Tight Tanks	0
Advanced Treatment Systems	1
Unrecorded/Unknown System Type	2
Total Systems	**18**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	4
Upgrade Ordered	1
Tight Tanks	0
Subtotal Known or Suspected Failures	**5**
Post-1996 Title 5 Systems	3
Pre-1996 Systems Passed Title 5	2
Subtotal Known Title 5 Compliant Systems	**5**
Non-Title 5 Inspected Systems	**8**
Total Systems	**18**

Area Summary:
28% Known or Suspected Failures
28% Known Compliant Systems

2.1.10 Sumner Street

The Sumner Street area includes Sumner Street, Old Bray Street, Great Hill Road, Elva Road, and Leaman Drive. There are a total of approximately 57 developed lots abutting these roadways. Of these, 4 are known or suspected failing systems. These systems are located north of the Walker Street intersection. There are three Title 5 systems installed after 1996, all of which are located north of the Walker Street intersection. Seven pre-1996 systems in this area have passed a Title 5 inspection. These systems are for the most part distributed evenly along Sumner Street. The remaining 43 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.10.

Table 2-10: Sumner Street Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	46
Cesspools	8
Tight Tanks	0
Advanced Treatment Systems	1
Unrecorded/Unknown System Type	2
Total Systems	**57**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	3
Upgrade Ordered	1
Tight Tanks	0
Subtotal Known or Suspected Failures	**4**
Post-1996 Title 5 Systems	3
Pre-1996 Systems Passed Title 5	7
Subtotal Known Title 5 Compliant Systems	**10**
Non-Title 5 Inspected Systems	**43**
Total Systems	**57**

Area Summary:
7% Known or Suspected Failures
18% Known Compliant Systems

2.1.11 Walker Street and Great Ledge Lane

Approximately 22 developed lots abut Walker Street and Great Ledge Lane. Of these, six are known or suspected failing systems. These systems are generally clustered around the Walker Street and Lincoln Street intersection. There are two Title 5 systems installed after 1996 and one pre-1996 system that has passed a Title 5 inspection. Title 5 septic systems are currently proposed for two lots on the north side of Walker Street. The remaining 13 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. These systems are generally evenly distributed throughout the area. The type and status of existing wastewater infrastructure in this area is shown in Table 2.11.

Table 2-11: Walker Street and Great Ledge Lane Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	19
Cesspools	1
Tight Tanks	0
Advanced Treatment Systems	1
Unrecorded/Unknown System Type	1
Total Systems	**22**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	4
Upgrade Ordered	2
Tight Tanks	0
Subtotal Known or Suspected Failures	**6**
Post-1996 Title 5 Systems	2
Pre-1996 Systems Passed Title 5	1
Subtotal Known Title 5 Compliant Systems	**3**
Non-Title 5 Inspected Systems	**13**
Total Systems	**22**

Area Summary:
27% Known or Suspected Failures
14% Known Compliant Systems

2.1.12 Concord Street West of Walker Creek

Approximately 18 developed lots abut Concord Street west of Walker Creek. Of these, two are known or suspected failing systems. Two systems have passed a Title 5 inspection. There does not appear to be any clustering of the failed or passed systems. The remaining 14 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.12.

Table 2-12: Concord Street West of Walker Creek Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	17
Cesspools	1
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	0
Total Systems	**18**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	2
Upgrade Ordered	0
Tight Tanks	0
Subtotal Known or Suspected Failures	**2**
Post-1996 Title 5 Systems	0
Pre-1996 Systems Passed Title 5	2
Subtotal Known Title 5 Compliant Systems	**2**
Non-Title 5 Inspected Systems	**14**
Total Systems	**18**

Area Summary:
11% Known or Suspected Failures
11% Known Compliant Systems

2.1.13 Concord Street from Walker Creek to Atlantic Street

This area of Concord Street between Walker Creek and Atlantic Street also includes lots that front on Cabot Lane and Whale Rocks Road. Approximately 52 developed lots are contained within this area. Of these, six have known or suspected failing systems. The failed systems appear to be clustered towards the Walker Creek side of Concord Street. Five systems were installed after 1996 and one pre-1996 system has passed a Title 5 inspection. In addition, three septic plans have been approved between Coles Island Road and Bray Street. The remaining 40 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.13.

Table 2-13: Concord Street from Walker Creek to Atlantic Street Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Pre-1996 Septic Systems	41
Cesspools	4
Tight Tanks	0
Advanced Treatment Systems	1
Unrecorded/Unknown System Type	6
Total Systems	**52**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	4
Upgrade Ordered	2
Tight Tanks	0
Subtotal Known or Suspected Failures	**6**
Post-1996 Title 5 Systems	5
Pre-1996 Systems Passed Title 5	1
Subtotal Known Title 5 Compliant Systems	**6**
Non-Title 5 Inspected Systems	**40**
Total Systems	**52**

Area Summary:
12% Known or Suspected Failures
12% Known Compliant Systems

2.1.14 Totten Lane, Jebeka Lane, and Lawrence Court

Totten Lane, Jebeka Lane, and Lawrence Court contain approximately 10 developed lots. Of these, there is one known or suspected failing system. Two systems were installed after 1996. The failed system and two post-1996 upgraded systems (one of which includes advanced treatment) are all oceanfront lots. The remaining seven systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.14.

Table 2-14: Totten Lane, Jebeka Lane, and Lawrence Court Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	5
Cesspools	1
Tight Tanks	0
Advanced Treatment Systems	1
Unrecorded/Unknown System Type	3
Total Systems	**10**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	1
Upgrade Ordered	0
Tight Tanks	0
Subtotal Known or Suspected Failures	**1**
Post-1996 Title 5 Systems	2
Pre-1996 Systems Passed Title 5	0
Subtotal Known Title 5 Compliant Systems	**2**
Non-Title 5 Inspected Systems	**7**
Total Systems	**10**

Area Summary:
10% Known or Suspected Failures
20% Known Compliant Systems

2.1.15 Coles Island Road

Approximately four developed lots are located off of Coles Island Road. Of these, there is one known or suspected failing system. One system has passed a Title 5 inspection. There is also one septic plan proposed for the area. The failed system is on an ocean front lot on Coles Island. The Title 5 inspected lot and the lot with the approved septic plan are both near the intersection of Concord Street. The remaining two systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.15.

Table 2-15: Coles Island Road Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	2
Cesspools	2
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	0
Total Systems	**4**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	1
Upgrade Ordered	0
Tight Tanks	0
Subtotal Known or Suspected Failures	**1**
Post-1996 Title 5 Systems	0
Pre-1996 Systems Passed Title 5	1
Subtotal Known Title 5 Compliant Systems	**1**
Non-Title 5 Inspected Systems	**2**
Total Systems	**4**

Area Summary:
25% Known or Suspected Failures
25% Known Compliant Systems

2.1.16 Bray Street between Sumner Street and Concord Street

The area of Bray Street between Sumner Street and Concord Street contains approximately 33 developed lots. Of these, two contain known or suspected failing systems. These systems are on the Concord Street side of Bray Street. Seven systems were installed after 1996 and three pre-1996 systems have passed a Title 5 inspection. The new systems and Title 5 inspected systems are generally located between Sumner Street and Thompson Mountain. The remaining 21 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.16.

Table 2-16: Bray Street Between Sumner and Concord Streets Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	23
Cesspools	7
Tight Tanks	0
Advanced Treatment Systems	2
Unrecorded/Unknown System Type	1
Total Systems	**33**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	1
Upgrade Ordered	1
Tight Tanks	0
Subtotal Known or Suspected Failures	**2**
Post-1996 Title 5 Systems	7
Pre-1996 Systems Passed Title 5	3
Subtotal Known Title 5 Compliant Systems	**10**
Non-Title 5 Inspected Systems	**21**
Total Systems	**33**

Area Summary:
6% Known or Suspected Failures
30% Known Compliant Systems

2.1.17 Fernald Street

Fernald Street has approximately 19 developed lots. Of these, there are no known or suspected failing systems. Three systems were built under the current Title 5 regulations, while an additional two pre-1996 systems have passed a Title 5 inspection. There is one approved septic plan proposed in the area. The remaining 14 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.17.

Table 2-17: Fernald Street Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	13
Cesspools	2
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	4
Total Systems	**19**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	0
Tight Tanks	0
Subtotal Known or Suspected Failures	**0**
Post-1996 Title 5 Systems	3
Pre-1996 Systems Passed Title 5	2
Subtotal Known Title 5 Compliant Systems	**5**
Non-Title 5 Inspected Systems	**14**
Total Systems	**19**

Area Summary:
0% Known or Suspected Failures
26% Known Compliant Systems

2.1.18 Concord Street from Essex Avenue to Causeway Street

On this area of Concord Street between Essex Avenue and Causeway Street there are approximately 41 developed lots. Of these, one lot has been ordered to upgrade its system. One system was installed after 1996 and an additional seven pre-1996 systems have passed a Title 5 inspection. The remaining 32 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.18.

Table 2-18: Concord Street from Essex Avenue to Causeway Street Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	24
Cesspools	10
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	7
Total Systems	**41**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	1
Tight Tanks	0
Subtotal Known or Suspected Failures	**1**
Post-1996 Title 5 Systems	1
Pre-1996 Systems Passed Title 5	7
Subtotal Known Title 5 Compliant Systems	**8**
Non-Title 5 Inspected Systems	**32**
Total Systems	**41**

Area Summary:
2% Known or Suspected Failures
20% Known Compliant Systems

2.1.19 Kent Road, Eveleth Road, West Parish Road, and Landing Road

In the vicinity of Kent Road, Eveleth Road, West Parish Road, and Landing Road there are approximately 21 developed lots. Of these, one lot has been ordered to upgrade its system and one lot is suspected of failing Title 5. Two systems were installed after 1996 and two pre-1996 systems have passed a Title 5 inspection. The remaining 15 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.19.

Table 2-19: Kent Road, Eveleth Road, West Parish Road, and Landing Road Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	13
Cesspools	6
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	2
Total Systems	**21**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	1
Upgrade Ordered	1
Tight Tanks	0
Subtotal Known or Suspected Failures	**2**
Post-1996 Title 5 Systems	2
Pre-1996 Systems Passed Title 5	2
Subtotal Known Title 5 Compliant Systems	**4**
Non-Title 5 Inspected Systems	**15**
Total Systems	**21**

Area Summary:
10% Known or Suspected Failures
19% Known Compliant Systems

2.1.20 Presson Point Road

There are approximately six developed lots along Presson Point Road. Of these, one lot is suspected of failing Title 5 and one lot has a tight tank. These two potential problem systems are on ocean front lots within Presson Point. The remaining four systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.20.

Table 2-20: Presson Point Road Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	3
Cesspools	2
Tight Tanks	1
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	0
Total Systems	**6**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	1
Upgrade Ordered	0
Tight Tanks	1
Subtotal Known or Suspected Failures	**2**
Post-1996 Title 5 Systems	0
Pre-1996 Systems Passed Title 5	0
Subtotal Known Title 5 Compliant Systems	**0**
Non-Title 5 Inspected Systems	**4**
Total Systems	**6**

Area Summary:
33% Known or Suspected Failures
0% Known Compliant Systems

2.1.21 Saville Road

There are approximately eight developed lots along Saville Road. All eight of these systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.21.

Table 2-21: Saville Road Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	5
Cesspools	2
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	1
Total Systems	**8**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	0
Tight Tanks	0
Subtotal Known or Suspected Failures	**0**
Post-1996 Title 5 Systems	0
Pre-1996 Systems Passed Title 5	0
Subtotal Known Title 5 Compliant Systems	**0**
Non-Title 5 Inspected Systems	**8**
Total Systems	**8**

Area Summary:
0% Known or Suspected Failures
0% Known Compliant Systems

2.1.22 Causeway Street, Rust Island, and Biskie Head

There are approximately 48 developed lots along Causeway Street and on Rust Island and Biskie Head. Of these, two lots have been ordered to upgrade their systems, two additional lots have known or suspected failing systems, and four lots utilize tight tanks. Five systems were installed after 1996, four of which include advanced treatment. Four additional lots containing pre-1996 systems have passed a Title 5 inspection. There is one approved septic plan for the area. The remaining 31 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.22.

Table 2-22: Causeway Street, Rust Island, and Biskie Head Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	24
Cesspools	12
Tight Tanks	4
Advanced Treatment Systems	4
Unrecorded/Unknown System Type	4
Total Systems	**48**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	2
Upgrade Ordered	2
Tight Tanks	4
Subtotal Known or Suspected Failures	**8**
Post-1996 Title 5 Systems	5
Pre-1996 Systems Passed Title 5	4
Subtotal Known Title 5 Compliant Systems	**9**
Non-Title 5 Inspected Systems	**31**
Total Systems	**48**

Area Summary:
17% Known or Suspected Failures
19% Known Compliant Systems

2.1.23 Concord Street from Causeway Street to Atlantic Street

This area of Concord Street between Causeway Street and Atlantic Street contains approximately 28 developed lots. Of these, there is one lot that is suspected of failing Title 5 and one tight tank. Two systems have passed a Title 5 inspection. The remaining 24 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.23.

Table 2-23: Concord Street from Causeway Street to Atlantic Avenue Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	21
Cesspools	2
Tight Tanks	1
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	4
Total Systems	**28**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	1
Upgrade Ordered	0
Tight Tanks	1
Subtotal Known or Suspected Failures	**2**
Post-1996 Title 5 Systems	0
Pre-1996 Systems Passed Title 5	2
Subtotal Known Title 5 Compliant Systems	**2**
Non-Title 5 Inspected Systems	**24**
Total Systems	**28**

Area Summary:
7% Known or Suspected Failures
7% Known Compliant Systems

2.1.24 Becker Lane, White's Mountain Road, and Thompson Street

In the area of Becker Lane, White's Mountain Road, and Thompson Street there are approximately 24 developed lots. Of these, one lot has been ordered to upgrade its system. Two systems have passed a Title 5 inspection and one septic plan is proposed. The remaining 21 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.24.

Table 2-24: Becker Lane, White's Mountain Road, and Thompson Street Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	20
Cesspools	1
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	3
Total Systems	**24**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	1
Tight Tanks	0
Subtotal Known or Suspected Failures	**1**
Post-1996 Title 5 Systems	0
Pre-1996 Systems Passed Title 5	2
Subtotal Known Title 5 Compliant Systems	**2**
Non-Title 5 Inspected Systems	**21**
Total Systems	**24**

Area Summary:
4% Known or Suspected Failures
8% Known Compliant Systems

2.1.25 Cedarwood and Fenley Roads

Approximately 24 developed lots abut Cedarwood and Fenley Roads. Of these, three lots contain known or suspected failing systems, an additional two lots have been ordered to upgrade their systems, and two lots utilize tight tanks. Two advanced treatment systems have been installed and one pre-1996 system passed a Title 5 inspection. The remaining 14 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.25.

Table 2-25: Cedarwood and Fenley Roads Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	19
Cesspools	0
Tight Tanks	2
Advanced Treatment Systems	2
Unrecorded/Unknown System Type	1
Total Systems	**24**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	3
Upgrade Ordered	2
Tight Tanks	2
Subtotal Known or Suspected Failures	**7**
Post-1996 Title 5 Systems	2
Pre-1996 Systems Passed Title 5	1
Subtotal Known Title 5 Compliant Systems	**3**
Non-Title 5 Inspected Systems	**14**
Total Systems	**24**

Area Summary:
29% Known or Suspected Failures
13% Known Compliant Systems

2.1.26 Atlantic Street from Concord Street to Atlantic Avenue

Approximately 36 lots abut Atlantic Street between Concord Street and Atlantic Avenue. Within these lots, there is one tight tank, one system suspected of failing Title 5, and one system that has been ordered to upgrade. Two post-1996 and nine pre-1996 systems have passed a Title 5 inspection, and one lot has an approved septic plan. The remaining 22 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.26.

Table 2-26: Atlantic Street from Concord Street to Atlantic Avenue Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	24
Cesspools	8
Tight Tanks	1
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	3
Total Systems	**36**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	1
Upgrade Ordered	1
Tight Tanks	1
Subtotal Known or Suspected Failures	**3**
Post-1996 Title 5 Systems	2
Pre-1996 Systems Passed Title 5	9
Subtotal Known Title 5 Compliant Systems	**11**
Non-Title 5 Inspected Systems	**22**
Total Systems	**36**

Area Summary:
8% Known or Suspected Failures
31% Known Compliant Systems

2.1.27 Valley Road Development

The Valley Road development includes Valley Road, Hilltop Road, Gull Lane, and Ridgewood Lane. Approximately 23 developed lots are located within this development. Of these, one utilizes a tight tank and two have post-1996 Title 5 compliant systems (one of which includes advanced treatment). The remaining 20 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.27.

Table 2-27: Valley Road Development Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	4
Cesspools	11
Tight Tanks	1
Advanced Treatment Systems	1
Unrecorded/Unknown System Type	6
Total Systems	**23**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	0
Tight Tanks	1
Subtotal Known or Suspected Failures	**1**
Post-1996 Title 5 Systems	2
Pre-1996 Systems Passed Title 5	0
Subtotal Known Title 5 Compliant Systems	**2**
Non-Title 5 Inspected Systems	**20**
Total Systems	**23**

Area Summary:
4% Known or Suspected Failures
9% Known Compliant Systems

2.1.28 Brooks Road Development

The Brooks Road development includes Hunter Road, Julie Court, and Brooks Lane. This area includes approximately 32 developed lots. Of these, three lots utilize tight tanks, and one lot has been ordered to upgrade its system. There are two post-1996 systems (one being an advanced treatment system) and five pre-1996 systems that have passed a Title 5 inspection. The remaining 21 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.28.

Table 2-28: Brooks Road Development Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	19
Cesspools	9
Tight Tanks	3
Advanced Treatment Systems	1
Unrecorded/Unknown System Type	0
Total Systems	**32**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	1
Tight Tanks	3
Subtotal Known or Suspected Failures	**4**
Post-1996 Title 5 Systems	2
Pre-1996 Systems Passed Title 5	5
Subtotal Known Title 5 Compliant Systems	**7**
Non-Title 5 Inspected Systems	**21**
Total Systems	**32**

Area Summary:
13% Known or Suspected Failures
22% Known Compliant Systems

2.1.29 Castle View Phase I Development

The Castle View Phase I Development includes Sea Fox Lane, Salt Marsh Lane, Schooner Ridge, and lots fronting on Bray Street. Approximately 43 lots are considered to be in the Castle View Phase I development. Of these, there are no failed systems. Records indicate that five systems were installed under current Title 5 regulations and that 11 systems install before 1996 have passed a Title 5 inspection. There are three approved septic systems planned for the area. The remaining 27 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.29.

Table 2-29: Castle View Phase I Development Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	40
Cesspools	0
Tight Tanks	0
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	3
Total Systems	**43**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	0
Tight Tanks	0
Subtotal Known or Suspected Failures	**0**
Post-1996 Title 5 Systems	5
Pre-1996 Systems Passed Title 5	11
Subtotal Known Title 5 Compliant Systems	**16**
Non-Title 5 Inspected Systems	**27**
Total Systems	**43**

Area Summary:
0% Known or Suspected Failures
37% Known Compliant Systems

2.1.30 Castle View Phase II Development

The Castle View Phase II Development includes Castle View Drive and Stella Maris Lane. Approximately 29 developed lots are considered to be in the Castle View Phase II Development. Of these, there are no failed systems. All 29 systems were installed under the current Title 5 regulations and utilize advanced treatment technologies. The type and status of existing wastewater infrastructure in this area is shown in Table 2.30.

Table 2-30: Castle View Phase II Development Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	3
Cesspools	0
Tight Tanks	0
Advanced Treatment Systems	26
Unrecorded/Unknown System Type	0
Total Systems	**29**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	0
Upgrade Ordered	0
Tight Tanks	0
Subtotal Known or Suspected Failures	**0**
Post-1996 Title 5 Systems	29
Pre-1996 Systems Passed Title 5	0
Subtotal Known Title 5 Compliant Systems	**29**
Non-Title 5 Inspected Systems	**0**
Total Systems	**29**

Area Summary:
0% Known or Suspected Failures
100% Known Compliant Systems

2.1.31 Atlantic Avenue, Atlantic Street, and Brookfield Drive

This area is bounded to the west by Atlantic Avenue, to the south and east by Atlantic Street, and to the north by Brookfield Drive. Approximately 26 developed lots are contained within this area. Of these, two lots contain systems that are suspected of failing Title 5, and there is one tight tank. Two systems were installed under the current Title 5 regulations and four pre-1996 systems have passed a Title 5 inspection. The remaining 17 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.31.

Table 2-31: Atlantic Avenue, Atlantic Street, and Brookfield Drive Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	20
Cesspools	0
Tight Tanks	1
Advanced Treatment Systems	0
Unrecorded/Unknown System Type	5
Total Systems	**26**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	2
Upgrade Ordered	0
Tight Tanks	1
Subtotal Known or Suspected Failures	**3**
Post-1996 Title 5 Systems	2
Pre-1996 Systems Passed Title 5	4
Subtotal Known Title 5 Compliant Systems	**6**
Non-Title 5 Inspected Systems	**17**
Total Systems	**26**

Area Summary:
12% Known or Suspected Failures
23% Known Compliant Systems

2.1.32 Wingaersheek

This study considers Wingaersheek as the area bounded to the west by Atlantic Avenue, to the southeast by Atlantic Street, and to the north by Coffins Beach (including all lots on Wingaersheek Road, Massachusetts Avenue, Twopenny Lane, and Sand Dollar Circle). There are a total of 212 developed lots in this area. Of these, three lots contain systems that are suspected of failing Title 5 and three lots have been ordered to upgrade their systems. Sixteen systems have been installed under the current Title 5 regulations and 25 pre-1996 systems have passed a Title 5 inspection. There are five approved septic plans in the area. The remaining 165 systems are considered to have an unknown status because they have passed the City's function check but have not had a Title 5 inspection. The type and status of existing wastewater infrastructure in this area is shown in Table 2.32.

Table 2-32: Summary of Wingaersheek Wastewater Disposal Systems

Existing System Type	Approx. # of Lots
Septic Systems	147
Cesspools	16
Tight Tanks	0
Advanced Treatment Systems	8
Unrecorded/Unknown System Type	41
Total Systems	**212**

System Status	Approx. # of Lots
Failed Title 5 and/or Function Test	3
Upgrade Ordered	3
Tight Tanks	0
Subtotal Known or Suspected Failures	**6**
Post-1996 Title 5 Systems	16
Pre-1996 Systems Passed Title 5	25
Subtotal Known Title 5 Compliant Systems	**41**
Non-Title 5 Inspected Systems	**165**
Total Systems	**212**

Area Summary:
3% Known or Suspected Failures
19% Known Compliant Systems

2.2 Existing Water Supply Infrastructure

Most of the Study Area is currently connected to deep water lines that provide year-round public water service. Year-round water lines run along the length of Essex Avenue, Concord Street, Atlantic Street, and many of the areas off of these main streets. Certain areas are connected to summer water lines that have been laid on the surface (not buried), so they must be drained in the winter. According to the water department, summer water lines are turned off and drained in October and then are turned on again in May. Sections of the Study Area with summer water service include Walker Court, part of Walker Street, Overlook Avenue, Rust Island, the Valley Road development, and the Brooks Road development. Private wells provide water to other sections of the Study Area. According to the Ward 5 City Councilor, several residents in the Study Area complain of lack of water pressure. In the past, it has been the City's policy to install deep water lines or replace old water lines at the same time that a new sewer line is installed.

Gloucester obtains its public water supply from a system of surface water reservoirs located within the City. The West Gloucester Reservoir System includes Haskell Reservoir, Wallace Reservoir, Dykes Reservoir, and Fernwood Reservoir. The East Gloucester Reservoir System includes Babson Reservoir, Klondike Reservoir, and Goose Cove Reservoir.

A Water Withdrawal Permit (WWP) from the Massachusetts Department of Environmental Protection (DEP) regulates the amount of water that the City is allowed to withdraw. The WWP allows an average daily withdrawal (averaged over a calendar year) of 3.75 million gallons per day (MGD). The actual average daily withdrawal in 2000 was 3.53 MGD, while the average daily withdrawal over the last five years has been 3.51 MGD. Therefore, the City is fairly close to its water withdrawal limit, with less than 250,000 gallons per day of surplus capacity, or enough water for about 800 additional single-family homes City-wide. However, it is difficult to estimate the exact amount of new development that could be accommodated under the current permit since water usage can fluctuate significantly from year to year, and industrial water usage, which can be significant, is subject to change.

If the City exceeds its WWP limit, it may need to institute additional water restrictions and conservation efforts. The City could also seek to increase its withdrawal limit, which will require DEP approval. If the City does not want to exceed its WWP limit, it will need to carefully manage, and to some extent curtail, growth within the Study Area as well as City-wide.

3. Water Resources and Water Quality

One objective of this study is to improve environmental quality in and around the Study Area by identifying sensitive natural resources, pinpointing sources of pollution that may be degrading these resources, and resolving these pollution problems. This section identifies existing natural resources and presents water quality data that can be used to identify the most pressing pollution problems in the Study Area.

3.1 Water Resources

The Study Area contains a wealth of natural resources that provide Gloucester with both economic and ecological values. These resources are described below, and shown in Figure 2. It is important to identify these resources not only for the ecological and hydrological functions that they provide, but also because they are subject to environmental laws and regulations that affect how they may be used or altered. Environmental laws and regulations relevant to the Study Area are discussed in Section 4.3.

3.1.1 Saltwater and Freshwater Wetlands

The Study Area contains an extensive system of saltwater and freshwater wetlands bordering the Annisquam, Little and Jones Rivers as well as Walker Creek and Farm Creek. These wetlands provide fish habitat during the early stages of several fish species' life cycles. Deep water species such as cod, pollock, haddock, and striped bass are all found in the marshes bordering the Annisquam River. Other important wetland functions include cleaning the surface and ground waters that flow into the coastal waterways; mitigating the damaging effects of flooding and storm tidal actions; and providing wildlife habitat, recreational resources, and aesthetic values.

3.1.2 Tidal Flats, Beaches, and Dunes

The tidal areas along the Annisquam and Essex Rivers provide some of the most productive clam flats in the state. The saltwater and freshwater wetlands that border these flats are critical to maintaining the viability of nearby shellfisheries because they filter sediment and pollutant loads, thus maintaining high water quality. Coastal wetlands are also a significant source of nutrients for shellfish growth, development and propagation.

Recreational beaches within the Study Area include Wingaersheek Beach, which is open to the public, and Coffins Beach, which is mainly privately owned. The Study Area contains three barrier beaches, as designated by the Massachusetts Office of Coastal Zone Management. These include significant portions of Coffins Beach, all of Wingaersheek Beach, and the southern tip of Twopenny Loaf. A barrier beach is a low, narrow strip of land generally consisting of coastal beach and dunes that extend roughly parallel to the coastline. The barrier beach is separated from the mainland by

a narrow body of fresh, brackish or saline water or a marsh system, and may be joined to the mainland at one or both ends.

Coastal dunes are unconsolidated deposits of sandy sediments subject to wind and coastal storm wave erosion. Coastal dunes are dynamic landforms that shift in size, shape and topography over time. For this reason, coastal dunes are inappropriate places for siting new development as well as wastewater systems. Within the Study Area, coastal dunes are located adjacent to Wingaersheek Beach, Coffins Beach, and the barrier beach south of Twopenny Loaf.

3.1.3 Rivers and the Ocean

The Study Area is bound on the northwest by the Essex River and on the east by the Annisquam River. Important tributaries to these rivers include the Jones and Little Rivers (both tributary to the Annisquam River) and the Walker and Farm Creeks (both tributary to the Essex River). The upper reaches of Walker Creek and Little River have significant freshwater flow, but the lower reaches are tidally influenced and brackish. The Annisquam and Jones Rivers are primarily tidal rivers with brackish or salt water. Several smaller freshwater streams and freshwater wetlands drain the uplands within the Study Area and feed into these creeks and rivers.

3.1.4 Parker River/Essex Bay ACEC

The Parker River/Essex Bay Area of Critical Environmental Concern (ACEC) contains 25,500 acres of barrier beach, dunes, salt marsh, and water bodies in Gloucester, Essex, Ipswich, Newbury and Rowley. The ACEC is protected as an important area for fishing, shellfishing, tourism, and recreation. The ACEC contains more than 10,000 acres of salt marsh, making this the largest salt marsh system north of New York's Long Island. Waters within the ACEC contain vast amounts of shellfish and host some of the largest anadromous fish runs of alewives and smelt on the North Shore.

Within the Study Area, the ACEC encompasses about 40% of the shoreline. The portions of the ACEC in the Study Area contain salt marsh in and around Walker Creek and Essex Bay; tidal flats and open channel along the Essex River; and some of the coastal dunes near Coffins Beach and Twopenny Loaf.

3.2 Water Quality Data

In order to determine where water quality problems exist and where pollution has harmed natural resources, Daylor reviewed water quality records and interviewed individuals familiar with water quality data in the Study Area. Daylor obtained information from Robert Knowles, the City's Shellfish Constable, and David Sargent, a local shell fisherman, Planning Board member, and Agent of the Board of Health. Mr. Sargent is part of a voluntary program to

monitor wastewater pollution in storm drains, streams, and wetlands that discharge into environmentally sensitive resource waters. This program provides a vital link between the Massachusetts Division of Marine Fisheries' (DMF's) monitoring of shellfish growing waters and the Gloucester Health Department's monitoring of failed and substandard on-site wastewater treatment systems.

Sampling is conducted for fecal coliform and optical brighteners. Fecal coliform indicates the presence of untreated human or animal waste, and is also a proxy for other harmful effluent components such as nitrates. Optical brighteners indicate that the wastewater stream contains laundry effluent, and therefore that it derives from a human source (whereas fecal coliform is also found in the wastes of other animals).

The fecal coliform standards for beaches and shellfish areas are as follows:

- For approved or conditionally approved shellfish areas the fecal coliform geometric mean may not exceed 14 fc/100 ml and not more than 10 percent of the sample may exceed 43 fc/100ml.
- For public bathing beaches and inland waters the fecal coliform geometric mean may not exceed 200 fc/100 ml and not more than 10 percent of the sample may exceed 400 fc/100ml.

The following sub-sections summarize field data and other information relevant to water quality in specific waterways. As shown in Figure 3, water quality is affected not only by pollution loading from developed areas but also by the flushing action of tides and currents, which tends to mitigate the effects of pollution on a water body.

3.2.1 Walker Creek

Walker Creek is one of the two most problematic waterways in the Study Area from a water quality perspective. Because of high bacteria counts exacerbated by the creek's poor flushing characteristics, Walker Creek is currently closed to shell fishing upstream of Mill Dam. High bacteria loading has been detected at tributaries to Walker Creek just north of Essex Avenue and at the Walker Street Bridge. Likely pollution sources include houses on and around Sumner Street, Walker Street, Essex Avenue, and Overlook Avenue.

A timeline of water quality sampling and identified problems within Walker Creek is summarized below.

- In 1990 unacceptably high levels of fecal coliform were detected at sampling stations along Walker Creek. At the Concord Street Bridge the geometric mean of the samples taken was 576 fc/100 ml. At the Walker Street Bridge the geometric mean of the samples taken was 1167 fc/100 ml.

- A 1992 DMF Sanitary Survey Report stated that

  "Due to the direct septic discharges and the presence of high fecal coliform values, upper reaches of Walker Creek must be classified as prohibited and closed. Until all pollution sources are mitigated and repeated testing can demonstrate low bacteria levels, this area must be considered unmanageable and subject to long term closure."

- In 1996 the City of Gloucester's Wastewater Management Plan was adopted. The Plan targeted Walker Creek and all drainage areas known to be contributing wastewater pollution as priority drainage areas.
- Between 1996 and 1999 samples collected by the Gloucester Shellfish Department and tested by the DMF laboratory continued to find unacceptably high levels of fecal coliform from sampling stations along Walker Creek.
- In 1999 the Gloucester Health Department found an 85 to 90% failure rate of septic systems that were inspected within a 50-foot buffer zone of Walker Creek.

3.2.2 Jones River

Jones River is the other of the two most problematic waterways in the Study Area from a water quality perspective because of failed on-site wastewater disposal systems. Currently the inlet adjacent to the Cape Ann Trailer Park and the creek that flows from Atlantic Street and Concord Street to the Jones River are closed to shell fishing year round. In addition the Jones River is closed seasonally inland from approximately Ram Island and Pearce Island. A timeline of water quality sampling and identified problems within Jones River and its tributaries is summarized below.

- In 1989 DMF conducted a mandatory shoreline survey and found unexpectedly high fecal coliform counts in Jones River. Sampling indicated an outfall located at the corner of Atlantic Street and Concord Street as the source of the pollution. A small buffer zone was established downstream of this outfall, and shell fishing was prohibited within that area. The remainder of the Jones River was downgraded from a 1-inch rainfall closure to a ½-inch rainfall closure.
- In January 1992, routine Federal Food and Drug Administration (FDA) sampling found that clams from the Jones River tested extremely high for fecal coliform, well above FDA standards.
- In July 1992, additional water and shellfish sampling found unacceptably high bacterial counts in the upper portion of the Jones River. The upper third of the Jones River was reclassified as prohibited to shell fishing.

- In March 1994, consistently high fecal coliform bacteria counts at the YMCA sampling station and sporadically high counts at the Long Wharf station resulted in all of Jones River being reclassified as prohibited to shell fishing
- In April 1994, in an effort to reopen shellfish beds by improving the quality of stormwater runoff, the City submitted a proposal to install Storm Treat System tanks in the Jones River watershed.
- In November 1994, the USDA Natural Resource Conservation Service submitted their "Final Inventory and Evaluation Report for Cedarwood Road." This report noted that

  "all the original septic systems installed for homes along Cedarwood Road predate Title V. Most of them have failed and been replaced. Soils in this area are and will remain unsuitable for installation of septic systems: therefore, any repair or replacement is temporary. . .we found soils on some lots were saturated with septic effluent within a foot of the surface."
- In December 1995, a modular stormwater treatment system was installed at the Cape Ann Trailer Park. Tanks were also planned for the Atlantic Street/Concord Street site, but were not able to be installed because of unanticipated problems during construction.
- Sampling of Jones River discharge points began in April 1996 with volume flow measurements. Coliform bacterial sampling and optical brightener sampling followed in May 1996 and June 1996, respectively.
- In 1996, the City of Gloucester's Wastewater Management Plan was adopted. This Plan targeted Jones River, and all drainage areas known to be contributing wastewater related pollution, as priority drainage areas.
- In April 1997, the study of Jones River discharge points was presented to the Massachusetts Coastal Zone Management Office. This study concluded that "inadequate separation between groundwater and septic systems is the reason that the Jones River is prohibited to shell fishing."
- In August 1997, dry weather sampling of the Jones River began.
- In July 1999, an injunction filed by the City of Gloucester against the Cape Ann Trailer Park was granted by the Superior Court. This injunction required the abandonment, upgrade and repair of substandard septic systems at that location.

3.2.3 Little River

The Little River is seasonally closed to shellfishing because of high bacterial counts and poor flushing characteristics. The inlet adjacent to Presson Point is prohibited from shellfishing year-round. Water quality sampling has indicated pollutant point sources in the area of Essex Avenue adjacent to Laurel Street, which may be caused by failed systems in the immediate vicinity. The tributary flowing along Essex Avenue behind the West Parish School is believed to contribute pollutant loads from upstream sources, such as the concentration of failed systems along Essex Avenue just east of Route 128.

3.2.4 Farm Creek

Water quality sampling within Farm Creek has not detected any pollutant point sources or bacterial levels that are high enough to justify closing shellfish beds. The relatively good water quality in Farm Creek is consistent with the fact that minimal development abuts or directly drains into the creek. While part of the Castle View Phase I and Phase II developments drain to Farm Creek, these houses are, for the most part, served by Title 5 compliant wastewater systems. In addition, the Castle View developments are served by a stormwater management system that greatly reduces the amount of polluted runoff reaching Farm Creek.

3.2.5 Essex Bay

Water quality sampling has sporadically detected pollutant point sources in a few areas. Most of these sources appear to be associated with isolated failed wastewater systems in the Jabeka Lane/Totten Lane area. However, because of tidal influences, Essex Bay experiences significant flushing and these sources have not contributed to a significant deterioration in water quality. The portions of Essex Bay within the Study Area are open to shell fishing year-round.

4. Wastewater and Environmental Regulations

This section provides an overview of state and local regulations that are relevant to the siting and design of wastewater systems, sewers lines, and development projects. This section does not contain a comprehensive description of each regulation, but instead summarizes those sections of each regulation that are applicable to this project.

4.1 State Wastewater Regulations

Relevant state wastewater regulations include Title 5 of the State Environmental Code (310 CMR 15.000) and Chapter 83 of the Massachusetts General Laws, which pertains to sewers, drains and sidewalks. Both of these regulations apply to any wastewater treatment infrastructure in the Study Area.

4.1.1 Title 5

Title 5 is a part of the Department of Environmental Protection's (DEP's) State Environmental Code, and specifies requirements for the siting, construction, inspection, upgrade, and expansion of sewage treatment and disposal systems up to an average daily flow of 15,000 gallons per day. Title 5 is a comprehensive document that includes provisions for the siting of systems; standards for the design, construction and repair of conventional systems, systems with advanced treatment, and shared systems; requirements for the maintenance and inspection of systems; procedures for seeking variances; regulations related to the transport and disposal of septage; and enforcement procedures. Title 5 represents a primary limitation on where and how wastewater treatment and disposal systems may be built.

While it is not feasible to summarize here all of the regulations that could apply to this study, Daylor has completed a comprehensive review of Title 5. A summary of some of the more relevant provisions follows:

- New on-site wastewater systems must be septic systems or advanced treatment systems designed and constructed in accordance with the standards of the revised Title 5 regulations.[1] Nonconforming systems include, but are not limited to, any system which is not in compliance with these standards and has not received a variance. These include cesspools, privies, failed septic systems, and systems with a design flow above 10,000 gallons per day (gpd). Nonconforming systems are allowed to continue operating, providing that they have not failed a Title 5 inspection.

[1] The current Title 5 regulations took effect in the mid-1990s. The provisions related to alternative systems took effect on November 10, 1994; the requirements for soil evaluations took effect on January 1, 1996; and all other provisions took effect on March 31, 1995. In this report, the current Title 5 regulations shall be referred to as the "1995 Title 5 Regulations."

- The DEP must approve all advanced treatment systems, shared systems, variances granted by the local authority, and upgrades or expansions of systems with flows between 10,000 and 15,000 gpd.
- Nitrogen removal (advanced treatment) is a required component of all systems where the design flow is greater than 2,000 gpd or if the system is located in a nitrogen sensitive area.
- Systems for single family homes must be designed for a flow of 110 gpd per bedroom. A minimum design capacity of 330 gpd must be used unless the home has a deed restriction that limits it to fewer than 3 bedrooms.
- The following are some of the key setback requirements measured in feet. The local Board of Health may specify larger setbacks, which would supersede these requirements (see Section 4.2.1).

	Septic Tank	Soil Adsorption System (SAS)
Surface Waters (except wetlands)	25	50
BVW*, Salt Marshes, Coastal Banks	25	50
Certified Vernal Pools	50	100

* Bordering vegetated wetlands, as defined in the MA Wetlands Protection Act.

- The soil adsorption system (SAS) must be located in an area where there is at least four feet of naturally occurring pervious material. Pervious material is defined as soil where the percolation rate is 30 minutes per inch or faster for new systems, or 60 minutes per inch or faster for upgrading existing systems.
- The required area for the SAS is based on the wastewater design flow as well as the percolation rate of the soils where the SAS is sited. The SAS area requirements will be increased by 50% when garbage grinders are installed. New systems are required to include a reserve area where the SAS may be sited in the future if the original SAS fails.
- The minimum vertical separation from the bottom of the soil adsorption system to the high groundwater elevation is four feet for soils with percolation rates greater than 2 minutes per inch and 5 feet for soils with percolation rates of 2 minutes per inch or less.
- No SAS shall be constructed in a velocity zone, coastal beach, barrier beach, dune, or regulatory floodway, unless all of the following are true:
    - The system is used solely to serve buildings in existence on the site as of March 31, 1995;
    - There is no increase in design flow;
    - No connection to public sewer is available;
    - The system cannot be sited elsewhere;

- The septic tank is sited outside the velocity zone or regulated floodway (either horizontally or vertically);
- The system achieves the required separation from high groundwater; and
- Any portion of the SAS within the velocity zone of a regulated floodway is a leaching bed, a trench system, or any other system constructed in accordance with the Wetlands Protection Act.

4.1.2 MGL Chapter 83

Chapter 83 of the Massachusetts General Laws ("MGL") grants statutory authority to Massachusetts municipalities to conduct various activities necessary for the construction and maintenance of sewers, drains and sidewalks. Under this regulation, cities and towns may:

- Construct, maintain, and operate sewer systems in public or private ways, as well as sewage treatment and disposal facilities, as they judge necessary for public convenience or public health. (Section 1)
- Purchase or take by eminent domain any land, rights of way, or easements necessary for accomplishing the purpose of sewage conveyance, treatment and disposal. (Sections 1 and 6)
- Prescribe rules and regulations regarding the use of sewers to prevent the entrance of substances that may interfere with sewage treatment and disposal. (Section 10)
- Order the owner or occupant of any building on a lot that abuts a street in which there is a sewer to connect to the sewer. (Section 11)
- Assess sewer fees to the persons who benefit from a sewer. (Section 14)

Section 3 of the regulation states that the owner of any land abutting a public or private way in which a common sewer has been laid has the right to connect to the sewer.

4.2 City of Gloucester Wastewater Regulations

Four City of Gloucester regulations are relevant to wastewater treatment and disposal. The Onsite Wastewater Regulations are a supplement to Title 5, enacted and enforced by the Board of Health. The Gloucester Utilities Ordinance pertains to sewer systems and specifies how such systems shall be funded, built, and maintained. The Gloucester Private Sewer Rules and Regulations specify the conditions under which private parties may build a sewer extension within the City. The STEP Sewer Rules and Regulations specify how Septic Tank Effluent Pump sewers ("STEP sewers") shall be operated and maintained within the City.

4.2.1 Board of Health Onsite Wastewater Regulations

The Board of Health most recently revised its Onsite Wastewater Regulations as of August 3, 2000. In terms of the design and construction of onsite wastewater systems, these Regulations generally allow for systems constructed in accordance with Title 5. However, the Regulations require greater setbacks from resource areas and stronger provisions for systems located within the Critical Buffer Zone (defined as the area within 50 feet of the edge of a wetland, waterway, or storm drain). Within this Critical Buffer Zone, the Board of Health is currently implementing a program to inspect all systems and require the upgrade of cesspools and failed septic systems.

The setbacks required by the Onsite Wastewater Regulations are as follows. Title 5 setback requirements are shown in parentheses.

	Septic Tank	Leaching Facility
Downgradient subsurface drain discharging directly to Resource Area*	--	50 (none)
Coastal Resource Area*	100 (25)	200 (50)
Freshwater Resource Area*	100 (25)	100 (50)

* Resource Area is as defined in the Massachusetts Wetlands Protection Act and/or the City of Gloucester Wetlands Ordinance.

4.2.2 City of Gloucester Utilities Ordinance (Chapter 23)

Article II of the City of Gloucester Utilities Ordinance pertains to sewers. This Ordinance is adopted by the City Council and promulgated pursuant to MGL Chapter 83 and MGL Chapter 40, Sections 5 and 6. This Article discusses policies for sewer construction, connection, and use, as well as sewer betterments and user fees.

Section 23-16 provides several guidelines as to how sewer systems shall be funded, built and maintained. In particular:

- Where the City is installing sewer mains, the City will lay sewer services from the main to the boundary of the way in the case of gravity sewers.
- If grinder pumps are used in a sewer system, the City will install and maintain the grinder pump, force main and appurtenances.
- If Septic Tank Effluent Pumping (STEP) is used in a sewer system, the City will install and maintain the STEP sewer components.
- The City will not provide pumping systems for vacant lots or uninhabited structures at the time of sewer construction.
- Installation and maintenance costs for the connection of properties developed after sewer construction shall be borne by the property owner.

- Betterment fees will be assessed to individual landowners for the sewer connection.
- Sewer privilege fees will be assessed to subdivisions on a per lot basis.

Section 23-22 provides that, for properties that are assessed a betterment but are not built upon at the time of sewer construction, the owner may apply for an extension of time for the payment until the land is built upon. However, the owner must pay an annual interest payment from the time the assessment is first made until the land is built upon and the assessment is paid.

Section 23-24 outlines a formula for calculating the amount of a sewer betterment fee based on the uniform unit assessment method allowed under MGL Chapter 83. In general, the betterment for each dwelling unit equals the total costs of the sewer project, divided by the number of potential connections, minus a City share equal to 25% or $6,000, whichever is less. Each property owner is assessed a betterment based, in most cases, on the number of dwelling units that currently exist on the property and/or that could be developed on the property under the current zoning. For non-residential properties, a unit equivalency is calculated in order to assess the betterment. It is important to note that, because of the City contribution for new sewer projects, all Gloucester taxpayers share in the cost of sewer extensions, even those who receive no direct benefit from such projects.

Section 23-36 states that no property will be required to connect to a municipal sewer until their on-site system fails to pass an inspection under Title 5 or the relevant Gloucester Board of Health regulations.

4.2.3 City of Gloucester Private Sewer Rules and Regulations

The Rules and Regulations Pertaining to the Acceptance of Private Sewers are promulgated pursuant to MGL Chapter 83, Section 10, and are administered through the Department of Public Works Director by his/her designee (the City Engineer). Under these rules and regulations, a private party may construct a private sewer extension from the nearest public sewer line to a property or set of properties that they wish to sewer. The City passed these regulations primarily to allow groups of homeowners with wastewater treatment problems to collectively fund a private sewer extension to their neighborhood if the City has not appropriated the funding to build a public sewer to their neighborhood. However, the regulations are also written so as to allow private landowners or developers to build a private sewer extension to a vacant parcel of land in order to facilitate the development of this land. Relevant sections of these regulations include:

Section 6: Any private sewer extension must be designed to accommodate any land with frontage on the street(s) being sewered. Undeveloped land will be factored

according to the current zoning as of the date of the complete submittal. This section also states that the City prefers that sewer pipes be installed in public or private roads rather than across private property. If sewers are approved to be built across private property, all temporary and permanent easements must be provided to the City.

Section 10: Applicants for private sewer extensions must pay a sewer privilege fee on a per lot basis in lieu of a betterment.

Section 12: Assessments for private sewers will be determined by dividing the total cost of the project by the number of probable connections.

Section 16: The City will assume ownership and maintenance responsibility for the private sewer five years after the date it was accepted, subject to certain conditions.

Section 17: Extensions to a sewer extension are allowed, but must be built in accordance with the Private Sewer Rules and Regulations.

These Rules and Regulations could have a potentially large impact on land use and development patterns within the Study Area by allowing private developers and landowners to build on land that was formerly undevelopable because of soil constraints that were not conducive to building an on-site septic system. Because private sewer extensions can be appended to other private sewer extensions, it is conceivable that most or all of the Study Area could eventually receive sewer service if these Rules and Regulations are kept in place.

4.2.4 City of Gloucester STEP Sewer Rules and Regulations

The City of Gloucester's Rules and Regulations Pertaining to Septic Tank Effluent Pump Sewers ("STEP sewers") regulate the operation and maintenance of the City's STEP sewer in North Gloucester and any future connections to the STEP sewer.[2] Presumably, these regulations would also apply to any STEP sewer built in West Gloucester. The Rules and Regulations are promulgated pursuant to MGL Chapter 83, Section 10, and are administered through the Department of Public Works Director by his/her designee (the City Engineer). The Rules and Regulations specify procedures for licensing and training contractors who can install STEP sewers; permitting STEP sewer connections; completing STEP sewer connections; and pumping, inspecting, maintaining, and repairing STEP tanks.

4.3 Environmental Protection Laws

Several state and local environmental protection laws regulate activities in and near designated resource areas such as wetlands, ACECs, and barrier beaches. These regulations generally apply to a wide range of activities, including the construction of buildings or

[2] For a discussion of STEP sewers, see Section 5.4.3.

additions, installation of septic system components, and earth moving activities. Specific provisions of these regulations are discussed below.

4.3.1 Massachusetts Wetlands Protection Act

The Massachusetts Wetlands Protection Act (MGL Chapter 131, Section 40 and the regulations in 310 CMR 10.00) governs activity within any defined resource area. Resource areas include any bank, freshwater wetland, costal wetland, beach, dune, flat, marsh or swamp bordering on any estuary, creek, river, stream, pond, lake, or the ocean. Resource areas also include land under any of these water bodies and land subject to tidal action, coastal storm flowage, or flooding. The Rivers Protection Act adds the "riverfront area" as an additional resource area under the Wetlands Protection Act regulations. The riverfront area is defined to extend 200 feet landward on each side of perennial streams and rivers.

The Gloucester Conservation Commission administers the Wetlands Protection Act within the City. Commission review is required for any work within a wetland resource area or its 100-foot buffer zone. Within resource areas, alteration of Bordering Vegetated Wetlands is generally limited to 5,000 square feet, and the wetlands must be replicated on the same property.

Applicants proposing work within the riverfront area must demonstrate that there are no practicable and substantially equivalent economic alternatives and no significant adverse impacts to the riverfront area. Typically, no work is allowed within the first 100 feet on each side of a perennial stream. Between 100 and 200 feet of a perennial stream, the Conservation Commission may allow the alteration of up to 5,000 square feet or 10% of the riverfront area, whichever is greater, with conditions.

Title 5 regulations, supplemented by the more stringent Gloucester Board of Health Onsite Wastewater Regulations, govern the siting, sizing and design of septic systems in and near wetland buffer zones and riverfront area. The Wetlands Protection Act does not add any supplementary regulations that are stricter than Title 5 in combination with the Onsite Wastewater Regulations.

4.3.2 City of Gloucester General Wetlands Ordinance

The City of Gloucester's Wetlands Ordinance provides the City's Conservation Commission with jurisdiction over resource areas and their respective buffer zones. As outlined in Section 12-10-1(2), resource areas are defined to include all resource areas protected under the Wetlands Protection Act, plus many isolated (i.e., non-bordering) wetlands, ACECs, a 100-foot buffer around ACECs, and vernal pools.

Sections 12-10-1(3)(a) and (b) establish the following activities subject to regulation under the ordinance.

- Activities that will remove, fill, dredge, or alter the resource area, or its 100-foot buffer zone.
- Activities within 200 feet of the upland edge if, in the judgment of the Commission, it will alter the resource area.
- Activities within 300 feet of an ACEC (this 300-foot zone includes the 100-foot area known as the "upland edge" plus an additional 200-foot buffer zone).

Section 12-10-3 provides for exceptions for emergency projects needed for the protection of the health and safety of the public, provided that the work has been ordered by the Commonwealth of Massachusetts or an agent of the Commonwealth.

Section 12-12-2(2)(b)(iii) states that no component of a drainage system or septic system shall be installed within 100 feet of the upland edge; that is, within 200 feet of an ACEC.

Section 12-17-4 states that no variances will be given for any proposed work within a designated flood hazard zone.

Section 12-24-6(2) states that the repair, replacement, or construction of sanitary sewage systems in flood hazard zones shall be designed to prevent infiltration of flood waters into the system and discharges from the system into the flood waters.

4.3.3 Provisions Relating to ACECs and Barrier Beaches

An Area of Critical Environmental Concern (ACEC) is a formal state designation identifying a significant sensitive natural resource area. The ACEC designation primarily affects the actions and jurisdictions of state environmental agencies. In other words, state reviewing agencies such as the Massachusetts Environmental Policy Act (MEPA) Office, the Department of Environmental Protection, and the Massachusetts Coastal Zone Management Program have lower review thresholds for projects within an ACEC. For the portion of the Parker River/Essex Bay ACEC within the Study Area, this designation is most likely to affect activities such as dredging and the construction of waterfront buildings, docks and piers. Gloucester's Onsite Wastewater Regulations and General Wetlands Ordinance provide more stringent requirements related to the siting of structures and wastewater systems near the ACEC (discussed above).

Executive Order 181 (August 1980) directs state agencies to adopt specific policies relevant to development on barrier beaches. One of these policies prohibits the expenditure of state or federal funding for construction projects (including public sewers) that encourage new growth and development on barrier beaches.

4.3.4 Stormwater Regulations

Stormwater runoff is a significant environmental issue, especially in a place such as the Study Area with shallow soils and nearby sensitive resources. The final outcome of this study could affect stormwater runoff patterns by promoting or restricting development in certain areas; by influencing the type and design of development that is allowed; and by altering water and wastewater discharge patterns by providing sewer service in certain areas. Within Gloucester, the management and discharge of stormwater is subject to several local, state, and federal regulations.

Two local regulations address stormwater management. The Stormwater Management regulations are contained within the Subdivision Rules and Regulations and apply to any project seeking subdivision review by the Planning Board. The regulations include submission requirements, performance standards, design standards, and maintenance requirements. The performance standards require that the post-development condition approximate the pre-development condition in terms of flow rate, velocity, volume and timing of runoff; that the project protect or improve water quality, groundwater levels and wetlands; and that certain other impacts be avoided. The design standards specify the types of structural and natural stormwater management practices and devices that are required or preferred.

The Drainage and Grading Requirements contained in section 1.3.3 of the zoning ordinance require the submission and approval of a drainage and grading plan for virtually any building permit other than minor additions. The plan must demonstrate that the design complies with the performance and design standards of the Gloucester Subdivision Stormwater Management Regulations to the extent possible. This provisions also states that stormwater runoff should be routed through areas of natural vegetation whenever possible and that stormwater systems not accepted by the City shall be maintained by the owners of the lots on which they are located.

The MA Department of Environmental Protection has adopted a Stormwater Management Policy to address water quality and quantity problems in the Commonwealth. The Policy applies to any applicant who requires Conservation Commission review under the Wetlands Protection Act, and is also intended as a guideline and model for municipalities to adopt within their local regulatory structure. The Policy includes nine Stormwater Management Standards that specify how stormwater must be treated and discharged under different circumstances. While there is some overlap between the City's stormwater regulations and the DEP's Stormwater Management Policy, each regulation also addresses certain topics that the other omits.

By 2003, Gloucester will be required to comply with the U.S. Environmental Protection Agency's Phase II stormwater program. This program applies to the

owners and operators of small municipal separate storm sewer systems (MS4s) in urbanized areas, such as Gloucester. Under the program regulations, the City will be required to control runoff from construction sites and developments; address illicit discharges to storm sewers; provide public education, outreach and participation programs related to stormwater management; and address municipal practices that may generate pollution or otherwise damage the environment. It appears as though the City's current stormwater management regulations will help to satisfy some of the Phase II requirements, but other efforts will probably be required, particularly the public education, outreach and involvement, and the examination of municipal practices.

4.4 Land Use Regulations

Gloucester's zoning ordinance and other land use regulations determine how land may be used and developed within the Study Area. These regulations were an important factor to consider in preparing the wastewater management plan since they affect the extent to which new wastewater infrastructure could act as a catalyst for addition growth and development. Section 9 of this report summarizes the major provisions of Gloucester's base zoning districts, overlay zoning districts, and additional land use regulations. Discussion of the potential impacts of these regulations is contained in Section 10.

5. Wastewater Conveyance and Treatment Possibilities

Daylor evaluated a wide range of wastewater conveyance, treatment and disposal systems as part of this project. The evaluation considered not just the treatment and disposal technologies themselves, but also cost implications, construction and maintenance factors, the potential for promoting increased growth, and the overall suitability to the Study Area given its physical and environmental characteristics. The three categories of systems that were considered include sewers, community wastewater systems, and on-site wastewater systems.

5.1 Sewers

Sewers convey wastewater from its source to a centralized wastewater treatment plant via a network of sewer pipes that are usually publicly owned and maintained. Sewage in the pipes can flow by gravity, or can be pumped by a variety of mechanisms, which are discussed below.

Sewers have several advantages compared to other types of systems. Because the wastewater is pumped to a centralized location, localized wastewater pollution can be virtually eliminated. (However, other local pollutant sources may still be present, such as nonpoint source pollution from paved surfaces. In addition, in some cases, the wastewater pollution is simply moved from one place to another, particularly if the sewer system is subject to combined sewer overflows during wet weather.) Sewers provide an element of convenience for property owners since the City is responsible for the wastewater conveyance and treatment systems and the owner only needs to pay a one-time betterment fee plus an annual sewer fee.

Sewers can be a significant catalyst for growth by allowing development to occur on lands that were formerly unbuildable. Depending on the community being served and the type of new development being proposed, this may be considered either an advantage or a disadvantage. Currently, local regulations allow private sewer extensions for new development, which could lead to considerable new development on steep, rocky, shallow to groundwater, or otherwise constrained lands. Even without these local regulations, state law allows property owners whose land abuts a street with a sewer to connect to that sewer.

For any wastewater system serving more than one home (including sewers and community systems), a wastewater conveyance system is required in order to transport wastewater from its source to the treatment and disposal location. Wastewater conveyance technologies reviewed for this study include gravity sewers, grinder pumps and Septic Tank Effluent Pump (STEP) systems. The type of conveyance system that is used is very important since wastewater collection and conveyance infrastructure can account for 60-80% of the total cost of a wastewater management system.

5.1.1 Gravity Sewers

Overview

The conventional gravity sewer has historically been the most popular method used for the collection and conveyance of wastewater. The sewer pipes, usually constructed of reinforced concrete or polyvinyl chloride (PVC), are installed on a slope to enable wastewater to flow by gravity from the discharge site to the intended treatment facility. Public gravity sewers are typically at least 8 inches in diameter, and they are typically installed at a minimum depth of 3 feet (required to prevent freezing) and a maximum depth of about 25 feet. Manholes, typically constructed of precast concrete with watertight seals, are installed at the end of each line, at all changes in grade, size or alignment, and at all intersections. Distances between manholes should typically be no greater than 400 feet.

Advantages

Gravity sewers are ideal for areas with flat topography. In flat areas, minimal slopes can be applied to all pipes, which limits the required excavation depth along the pipe route. When installed properly, gravity sewer systems require limited maintenance. Energy requirements are limited to the electrical demands of pump stations.

Disadvantages

In areas with challenging topography, gravity sewer systems require additional infrastructure to produce efficient wastewater collection. Pump stations with sump capacity may be required at strategic locations (i.e., low elevation points) to convey wastewater to the treatment works. In addition, in hilly terrain sewers may need to be installed at a much greater depth in order to maintain a downhill pipe angle in all places. The presence of rock greatly increases the cost of the gravity sewer because it makes excavation considerably more expensive. For these reasons, installation of gravity sewers may not be economically feasible in areas of significant topography, high groundwater, structurally unstable soils, and rock.

Manhole locations can be sources of odor, and odor control may be necessary with the conveyance of high strength waste streams. Also, gravity sewer systems can be subject to infiltration and inflow, since they are not pressurized. Infiltration refers to the seepage of undesirable water (typically high groundwater) into the sewer system through defective pipes, pipe joints, connections, or manhole walls. Inflow refers to sewer connections that are used for stormwater collection purposes. Infiltration and inflow can result in undesirable increases in the volume of wastewater being conveyed to the treatment plant, thus adding to the overall cost of wastewater treatment.

5.1.2 Grinder Pump Pressure Sewers

Overview

Whereas gravity sewers rely on downhill flow to convey wastewater, pressure sewers can convey water downhill or uphill by the force of a grinder pump. In these systems, wastewater from the discharge site is conveyed by gravity to a wet well containing the grinder pump, which is activated by level sensors. The grinder pump connects to a pressurized discharge pipe, which empties into a pressurized sewer line that terminates at a treatment plant or gravity sewer.

The grinder pumps are usually small, requiring typically one horsepower. The pumps are equipped with a grinding mechanism that macerates the solids within the waste stream. While each connection would have its own grinder pump, Chapter 23 of the Gloucester General Ordinance states that the City will install and maintain the pumps. Grinder pump systems are best suited to areas where the construction of gravity sewers is complex and/or cost prohibitive.

Advantages

Pressure sewers will not experience any infiltration. Also, pressure sewers require only 2- to 4-inch diameter piping, as opposed to 8-inch piping for gravity sewers. Due to the small pipe diameters, curvilinear horizontal alignment, and profile paralleling the ground surface, excavation depths and volumes are typically much smaller for grinder pump systems than for conventional gravity sewer systems. Cost comparisons between hilly areas served by grinder pump systems and areas served by gravity systems with a pump station indicate that grinder pump systems can cost significantly less to construct and maintain.

Disadvantages

Due to their mechanical nature, grinder pump units require electricity and maintenance. While there is no required maintenance schedule for grinder pump units, the mean time between service calls is roughly 8 to 10 years. Also, pumps must be rebuilt every 10 to 15 years. Because of the pump's electrical requirement, power outages result in the disruption of wastewater conveyance. However, wet wells are designed to provide some storage capacity during power outages.

5.1.3 STEP (Septic Tank Effluent Pump) System

Overview

A Septic Tank Effluent Pump (STEP) system contains a septic tank and a pump at each wastewater service connection. Similar to the grinder pump system, the STEP system discharges into a pressurized pipe system that terminates at a treatment plant or gravity sewer. The septic tank provides a level of pre-treatment, removing most settleable and floatable solids from the waste stream. The pump system can be

installed in the septic tank or in a separate wet well and typically requires a 0.33 to 0.5 horsepower motor.

While each connection would have its own septic tank, Chapter 23 of the Gloucester General Ordinance states that the City will install and maintain the STEP sewer components. The City's Rules and Regulations Pertaining to Septic Tank Effluent Pump Sewers regulate the operation and maintenance of STEP sewers in Gloucester.

Advantages

The STEP system requires a smaller diameter pipe than a gravity sewer since system is pressurized. The minimum diameter is typically 1¼ inches for service connections and the smallest mains, and 4 to 6 inches for large mains. Manholes are not necessary in a STEP system; in fact they are usually a wasteful expenditure and an unnecessary source of infiltration and inflow.

Disadvantages

The septic tank must be inspected on a frequent basis and pumped if needed. The system requires appurtenances including but not limited to cleanouts (for flushing), automatic air release valves, pressure sustaining valves, and gate valves. Odor control may be required at access points. STEP units situated above the hydraulic grade line must be equipped with anti-siphon valves to prevent draining of the septic tanks' contents. Also, based on the City's experience with STEP systems in North Gloucester, the City would need to have personnel on call to respond to system emergencies and storm events.

5.2 Community Wastewater Systems

Community wastewater systems convey wastewater from a cluster of homes and/or businesses through a network of pipes to a common treatment and disposal facility where the wastewater is discharged to the ground, similar to an on-site septic system. Under Title 5, community wastewater systems up to 10,000 gallons per day are allowed, with an increase to 15,000 gpd allowed subject to DEP permitting requirements. A nitrogen removal system (advanced treatment) must be included for any system over 2,000 gpd located in a nitrogen sensitive area. Historically, community wastewater systems have been used both by private developers and by municipalities.

Another type of community wastewater system is a package treatment plant, which can accommodate flows greater than 15,000 gpd. However, these systems were not considered for use in the Study Area because they tend to be significantly more expensive to build and permit than community wastewater systems regulated under Title 5.

Community wastewater systems offer some of the benefits of sewers without the same potential to promote new growth. If the system is owned and maintained by the City, the individual homeowner may have few or no wastewater-related responsibilities, similar to a sewer system. Whereas a sewer pipe is always designed and built with excess capacity, a community wastewater system could be built to accommodate only existing development, or a finite amount of new development (such as infill development or expansions of existing houses). For this reason, a community wastewater system can be sized to accommodate only the amount of new growth that the City actually wants, and not act as a catalyst for unplanned growth. On the downside, community wastewater systems require a sufficient area of pervious soils for the leaching field. Such soils are not common in the Study Area.

Within Massachusetts, community wastewater systems have been used primarily to service new development in areas where sewer is not available. These systems have been used throughout the state for residential subdivisions, multi-family housing (e.g., retirement communities), schools, and shopping centers, with flows ranging from a few thousand gallons per day up to 20,000 or more gpd. In cases where there are multiple users discharging to the system, a homeowners' association or condo association is usually established to maintain the system. Municipally-owned and maintained systems have also been recommended to remediate existing wastewater problems in Vineyard Haven and Duxbury, Massachusetts.

Outside of Massachusetts, there are many examples of municipalities using community wastewater systems to remedy existing problems because these systems were found to be the most cost-effective and/or environmentally compatible alternative. For example, in Warren Village, Vermont, dense development, small lot sizes, and nearby streams had resulted in failed septic systems and water pollution. When users determined that a centralized sewer system was too expensive, the town identified two parcels in the village center (a soccer field and a vacant parcel) that could serve as common leaching fields (total capacity of 30,000 gpd) for lots without adequate on-site disposal capacity. The town established a wastewater management district, which charges users about $250 per user per year to discharge to the community system.

If Gloucester chooses to build one or more community wastewater system, several different construction and management arrangements are possible. Similar to Warren Village, the City could construct and maintain the system itself and charge users an initial betterment fee as well as an annual user fee. This arrangement would be identical to a sewer system in that the City would bear full responsibility for operating and maintaining the system. A second option is for the City to contract out the system operation and maintenance to a private company under a long-term contract that would guarantee fixed annual costs for a period of years. Depending on a number of factors, outsourcing may or may not be more economical for the City and the ratepayers. A final possibility is for a group of homeowners to build a system on their own initiative, perhaps with technical and/or financial assistance from the City. A homeowners association could be formed in order to undertake operation and maintenance,

similar to the management structure in a condo or single-family residential development. Under an arrangement of City management or City-facilitated management, the wastewater system should not present a barrier to homeowners selling their home or potential homebuyers obtaining a mortgage.

The following subsections discuss the feasibility of community wastewater systems within the Study Area by examining the availability of pervious soils within the Study Area as well as several different advanced treatment technologies that can be used within community wastewater systems. The discussion of wastewater conveyance options in Section 5.1 (i.e., gravity sewers, grinder pump sewers, and STEP systems) is also relevant to community wastewater systems since these systems require the conveyance of wastewater from the source to the shared leaching field.

5.2.1 Areas of Potentially Suitable Soils

In order to determine the feasibility of siting community wastewater system(s) within the Study Area, Daylor evaluated soils to identify areas that may have pervious soils that are suitable for wastewater disposal. This analysis is also relevant to the siting of on-site wastewater systems. Initial soils information was obtained from the USDA Soil Conservation Service (SCS) maps for the area. While virtually all of these soils were identified as having constraints for the installation of septic systems, some of the soils were more suitable than others. Soils were aggregated into six classes to identify those soil types most conducive for wastewater disposal. These classes include:

Class:	Description:
1	High water table
2	Shallow depth to bedrock
3	Excessive permeability
4	Entire soil profile percolates slowly
5	Substratum percolates slowly
6	Not rated

A summary of the soil types from the SCS maps is presented in Table 5-1.

Table 5-1: Soil Types

Soil Series	Symbol	Limitation Class	Class
Annisquam	An	Severe: percs slowly	5
Beaches	Ba	Not rated	6
Boxford	Bu	Severe: wetness; percs slowly	4
Canton	Cc, Cb	Severe: poor filter	3
Chatfield	Cr	Severe: depth to bedrock	2
Deerfield	De	Severe: wetness; poor filter	3
Dumps	Du	Not rated	6
Elmridge	El	Severe: wetness; percs slowly	5
Freetown	Fm	Severe: wetness	1
Freetown	Fp	Severe: ponding	1
Hinckley	Hf	Severe: poor filter	3
Ipswich	Iw	Severe: ponding, flooding	1
Maybid	Ma	Severe: ponding, percs slowly	4
Merrimac	Mn	Severe: poor filter	3
Montauk	Ms	Severe: percs slowly	5
Paxton	Pg	Severe: percs slowly	5
Pipestone	Pe	Severe: wetness, poor filter	1
Ridgebury	Ri	Severe: percs slowly; wetness	1
Rock outcrop	Rx	Severe: depth t o rock	2
Scarboro	Sb	Severe: Ponding, poor filter	1
Scitico	Sc	Severe: wetness, piping	1
Scituate	So	Severe: percs slowly, wetness	5
Sudbury	Sr	Severe: wetness, poor filter	1
Swansea	Ss	Severe: wetness, poor filter	1
Udorthents	UD	Not rated	6
Urban land	Ur	Not rated	6
Walpole	Wa	Severe: wetness, poor filter	1
Wareham	We	Severe: wetness, poor filter	1
Whitman	Wh	Severe: percs slowly, ponding	1
Windsor	Wn	Severe; poor filter	3
Woodbridge	Ws, Wr	Severe: percs slowly, wetness	5

Soil classes 1 and 2 (high water table and shallow depth to bedrock, respectively) comprise more than 90% of the Study Area and have extremely limited ability to be used for wastewater discharge. Class 4 soils are also of very limited usefulness

because they would typically not pass a Title 5 perc test. Soils in classes 3 and 5 may have some potential to be used for wastewater discharge, and are distributed in pockets throughout the Study Area. Class 3 soils (excessive permeability) typically have sufficiently fast percolation rates to be used for wastewater discharge. Class 5 soils can sometimes be mounded to improve permeability and groundwater discharge potential. Class 6 soils are disturbed areas that can vary greatly in character but are generally not suitable for wastewater disposal.

For areas that contained Class 3 and Class 5 soils, Daylor sought additional information on the feasibility of using these areas for community wastewater systems. This information included:

- Is the soil area large enough to function as a wastewater disposal area for a community system?
- Does the Board of Health have any records of perc tests that were conducted in the area that indicate whether the soils are actually suitable for wastewater disposal?
- Who owns the property? If the City does not own it, what are the chances that the City could obtain it?

Based on this information, Daylor compiled a list of potential areas for siting a community wastewater system. These areas are described below and shown in Figure 4. It is important to note that additional field testing will be required to ascertain that these areas would in fact be useable for a community wastewater system.

Areas of Excessive Permeability (Class 3)

Various pockets of class 3 soils are distributed throughout the Study Area. Class 3 soil areas adjacent to or near developed areas were thoroughly investigated to determine their potential suitability for accommodating a community wastewater system. Remote or isolated areas with excessive permeability were not analyzed. The analysis identified four areas with highly permeable soils near existing developed neighborhoods. Many of these areas are in private ownership and would need to be purchased if they were to be used for a community wastewater system.

Walker St./Keystone Rd. Area: Potential leaching areas include an 8-acre section of land south of Walker St., a 4-acre area north of Walker St, and a 9-acre area along Lincoln St. and Mathieu Hill Rd. A limited area (about 1.5 acres) of permeable soils exists along Great Ledge Lane; however this location is adjacent to Walker Creek and should therefore be eliminated from the site selection process. The aforementioned areas are also adjacent to wetlands; however their large size should allow the required offset distances for a wastewater system.

Little River Area: The neighborhood surrounding Kent Rd. and Eveleth Rd. contains a variety of soils that represents the largest single area of excessively permeable land in the Study Area. However, this tract of land is adjacent to a proposed gravity sewer main along Route 133 and the entire neighborhood is amenable to a conventional gravity wastewater conveyance system. The Presson Point area contains a 10-acre tract of high permeability soils. One other potential location in the Little River area is located near Route 128.

Thompson Mountain Area: Two distinct areas near Cedarwood Rd. may provide feasible locations for the development of wastewater treatment and groundwater discharge infrastructure. A site northwest of Cedarwood Rd. is roughly 8 acres; however it is located at the base of Thompson Mountain, which may pose challenging topographic conditions. The other site, situated south of Cedarwood Rd., is a 5.3-acre tract of land with an appealing location and topography for the development of a community wastewater system. Another potential location is situated east of the intersection of Concord St. and Bray St. This area contains roughly 4 acres of highly permeable soils. However, it is not very close to any of the developed neighborhoods in the Thompson Mountain area.

Atlantic Avenue: An area surrounding the intersection of Atlantic Ave. and Atlantic St. contains potentially suitable soils for a wastewater treatment and groundwater discharge system. This area is moderately large (8.5 acres) and is situated equidistant from two developed neighborhoods. Although this area is bordered by wetlands to the east, its large size may allow the required offset distances for a wastewater system.

Areas with a Substratum that Percolates Slowly (Class 5)

Class 5 soils are less desirable for wastewater disposal systems than Class 3 soils. However, mounding could potentially be used to make these areas suitable for groundwater discharge. Mounding is the introduction of a suitable soil layer that contains permeable natural materials. Although system construction in these areas would incur additional construction costs due to the need to import soils, these areas were nevertheless completely investigated and compared to other alternatives. Due to their size and location, two pockets of Class 5 soils within the Study Area provide potentially feasible locations for siting a community wastewater system.

Atlantic St. Area (Southern Portion): A large area along the southern portion of Atlantic St., near Camp Spindrift, contains soils with a slowly percolating substratum. The suitability of this area is increased by its large size and its location. The area is roughly 17 acres, is accessible to Atlantic St., and is situated near three densely developed neighborhoods along Atlantic St. It is bordered by wetlands to the

south; however its large size may allow the required offset distances for a wastewater system.

South of Bray St. & Salt Marsh Lane: Another moderately large tract of land with a slowly percolating substratum is located in an area south of Bray St. and Salt Marsh Lane. The site is accessible to both roadways and is bordered to the northeast by wetlands. While developed neighborhoods are situated to the north and south, the area of consideration is within a large undeveloped area of land. The accessibility and size of this area enhance its suitability as a potential site for a wastewater system, although steep topography in areas may present an obstacle.

5.2.2 Advanced Wastewater Treatment Systems

This section discusses several types of advanced wastewater treatment systems to evaluate their feasibility for use in on-site or community wastewater systems in the Study Area. Technologies that were evaluated include intermittent and recirculating sand filters, peat filters, trickling filters, activated sludge systems, and batch reactors. Most of these systems can be designed for a minimum of one household or can be used as shared systems by multiple homes (clusters) that convey wastewater to a common treatment and disposal location. Various alternative treatment technologies from each of these categories have been used in Massachusetts over the past five years as a result of the 1995 Title 5 regulations.

It is important to note that, pursuant to Title 5, a certified Massachusetts wastewater treatment operator must maintain these treatment systems on an ongoing basis. Because of the high treatment level that advanced treatment systems can provide, Title 5 allows a reduction in the size of the required soil absorption system under some circumstances if one of these systems is used.

The following section provides a brief summary of some of the available advanced treatment technologies. Familiarity with the following technical terms may be useful:

- **Anoxic Zone** refers to an area with little or no available oxygen. The microbes that live in anoxic conditions can provide an additional level of nitrogen removal.
- **Denitrification** is a biochemical process that turns nitrates into nitrogen gas, which escapes into the air. Denitrification requires the presence of a soluble organic carbon source. The denitrification process in a wastewater treatment system is generally intended to reduce effluent nitrate concentrations to 10 mg/l or less.
- **Primary Treatment** is the most basic form of wastewater treatment and refers to the separation of liquid effluent from solids that settle and grease and scum that floats.

- **Secondary Treatment** involves biological or chemical treatment of the liquid effluent to remove organic compounds including microbial pathogens.
- **Tertiary Treatment**, sometimes called advanced treatment, removes all other wastewater contaminants, including nitrogen, to levels sufficient to result in potable water.

Sand Filters

Sand filters have been used for wastewater treatment for over 100 years and were frequently used for community wastewater treatment systems prior to 1900. Recently, there has been a resurgence of interest in the use of sand filter technology for wastewater treatment in small communities and at single-family homes because these systems provide a very high level of wastewater treatment at fairly reasonable costs.

Recirculating sand filters (RSFs) are often used in series between the septic tank and soil absorption system. RSFs utilize a recirculating process that introduces varying proportions of untreated septic tank effluent with sand filter effluent to the sand filter. Effluent is applied to the sand filter, collected in an under-drain, and directed back to the recirculation tank by gravity or a pump system. Typical recirculation ratios are 5:1, but they can be greater for residential units. Recirculation splits are achieved with mechanical valves, flow diverters or pumps which discharge a portion of the recirculation tank effluent to a soil absorption system. The entire wastewater treatment system includes the following components: a septic tank, recirculation tank, sand filter bed, under-drain, effluent discharge system, and soil absorption system.

Two advantages of RSFs are that they require minimal maintenance and their simplicity provides fewer challenges to the operator. Construction costs are slightly less than for other treatment alternatives discussed in this section. On the downside, RSFs must be carefully monitored during initial operation, to assure that the system is providing acceptable levels of treatment and to determine if recirculation ratios need to be adjusted. Due to sand bed requirements, the RSF system may require a larger footprint than other technologies discussed in this section.

RSFs are not a proprietary technology, and can be designed and installed by many engineering and construction firms.

Peat Filters

A peat system functions much like a conventional Title 5 system except that the wastewater is treated by 2-3 feet of peat before being discharged to the ground. Peat filters provide secondary treatment by removing suspended solids, organic particles, and some amount of nitrogen. Peat systems are relatively inexpensive and do not

require any particular maintenance beyond what is required for an ordinary Title 5 system. Peat filter systems can be custom designed, or a pre-built unit such as a Puraflo Peat Biofilter can be purchased.

Trickling Filter Systems

Trickling filter systems provide secondary wastewater treatment through the natural process of biochemical oxidation. The filter media can consist of a wide range of materials such as plastic, foam, or stones. Wastewater is trickled over a bacterial mat that grows on the filter surface and removes nitrogen. For maximum nitrogen removal, some units add an anoxic zone within the filter. Trickling filters can provide high levels of wastewater treatment, especially when they are equipped with an anoxic zone.

Several biofilters are commercially available, including the Ekofinn Bioclere, the Waterloo Biofilter, and the Orenco Trickle Filter. DEP has approved the Bioclere filter for general use outside of nitrogen sensitive areas. The Bioclere unit, one of the more commonly used systems, is a fully enclosed design that eliminates the potential problems of noise, odor and insects. Bioclere systems have the ability to tolerate wastewater flow and contaminant load variations. The systems can be installed below grade, resulting in unobtrusive installation close to dwellings.

Activated Sludge Systems

In activated sludge systems, a two-zone design is used to treat and denitrify wastewater. Wastewater is recirculated between oxygen-rich and oxygen-poor zones to maximize treatment and nitrogen removal.

The most common activated sludge system is the FAST system. FAST systems can accommodate a wide range of wastewater flows from 500 to 9,000 gallons per day to serve single homes, clusters of homes, and even small communities. Under Title 5, the FAST unit is installed within the septic tank and discharges to a soil absorption system. Wastewater is introduced into the septic tank where natural separation and settling of biological solids occurs in the first compartment of the tank. A remote air blower delivers large volumes of air into the second compartment of the tank, which contains the FAST unit. The air flow creates a vigorous movement of water, enabling FAST units to be oxygen-rich and self-cleaning. The FAST treatment module provides an environment that allows nitrifying bacteria to grow and multiply. These bacteria digest the impurities within the waste stream resulting in a clear, odorless, high quality effluent. FAST systems are relatively easy to install and maintain, and can be added to existing septic systems if an upgrade is required.

Batch Reactors

Batch reactors treat one batch of wastewater at a time, alternating oxygen-rich and oxygen-poor cycles to maximize nitrogen removal. Batch technology is most commonly used in larger systems that have the ability to control wastewater flows through various valves, pumps and storage tanks. Its advantage is higher-quality wastewater effluent through precise control of the nitrification and denitrification processes. Two batch reactors systems available for use in Massachusetts are the Amphidrome and the Cromaglass system.

The Amphidrome system consists of a deep bed filter that alternates between aerobic and anoxic treatment, allowing nitrification and denitrification of the waste stream to be completed in a single reactor. The cyclical action of the system is created by allowing a batch of wastewater to pass from the anoxic equalization tank through the granular biological filter into the clear well, and then reversing the flow through the use of a pump. The reverse flow passes from the clear well up through the filter, where it overflows into a trough that carries it back to the anoxic equalization tank. This cycle is repeated multiple times while the treatment is allowed to progress from aerobic to anoxic conditions within the filter. Once sufficient cycles have been repeated to ensure the required degree of treatment, a batch of effluent is discharged. Typically, effluent from Amphidrome treatment units is discharged to a soil absorption system.

Batch reactors provide a high level of treatment that typically reduces the required leaching area needed for effluent discharge. The systems can be installed below grade, resulting in unobtrusive installation close to dwellings. The primary disadvantage of these systems is that they require accurate installation and a knowledgeable operator since they rely on electronic controllers.

5.3 On-Site Wastewater Systems

On-site wastewater systems include septic systems, advanced treatment systems, cesspools, and tight tanks. Pursuant to Title 5, the construction of on-site systems requires a sufficient area of naturally occurring pervious soils. Despite the prevalence of rock, ledge, and steep slopes within the Study Area, many Title 5 compliant systems have been designed, permitted and built in recent years. Many of these systems were required to install advanced treatment systems to provide satisfactory wastewater treatment and/or because of site constraints such as high groundwater or a small area of pervious soils. Because of environmental constraints coupled with regulatory requirements, new on-site systems within the Study Area tend to be very expensive.

Daylor evaluated the distribution and status of on-site septic systems, advanced treatment systems, cesspools, and tight tanks to determine the viability of continuing to use on-site

systems in each neighborhood within the Study Area. The results of this analysis is discussed in Section 2.1 and shown on Figure 1 of this report. Daylor also identified locations where on-site systems have been proposed and/or approved since 1996 in order to gain additional information as to where on-site systems may be a feasible option for future wastewater management.

In Massachusetts, individual property owners typically operate and maintain on-site wastewater systems. One benefit of this arrangement is that the municipality has little financial or technical responsibility for wastewater treatment. However, individual property owners do not always operate or maintain their system in an optimal way, which can result in premature system failure, water pollution, and public health threats. To address these problems, some municipalities institute centralized management of on-site wastewater systems to provide more control over the quality of on-site treatment.

As part of the City's Consent Degree related to the earlier North Gloucester wastewater management project, the City was required to develop and implement a management plan that insures the long-term operation and maintenance of any alternatives to conventional sewers. As outlined in Gloucester's Wastewater Management Plan, the City has instituted several elements of a centralized management program that appear to be effective in identifying and remediating public health and water quality problems associated with on-site wastewater disposal. First, the City requires all septic tanks to be pumped and checked every 3½ years. Information from the check is entered into a database and a Title 5 inspection is ordered if a problem is identified. Second, the City has been implementing its 1996 Comprehensive Wastewater Management Plan to address nonpoint source pollution from on-site systems. In accordance with this plan, the Board of Health is ordering mandatory Title 5 inspections, and upgrades if necessary, for systems near water bodies within priority drainage areas. Finally, the City offers financial assistance for homeowners who are required to upgrade or replace their on-site system. This funding is provided, in part, through the State Revolving Fund and is administered by the Board of Health and the City's Grants Department. The program provides a 0% loan with 25% of the cost of the loan paid by the City, up to $6,000 per property.[1]

Other communities that have centralized management programs for on-site wastewater systems have focused on homeowner outreach and education campaigns related to proper system operation and maintenance. The most comprehensive centralized management would involve the City maintaining on-site systems and possibly even repairing or upgrading failed systems. Users would pay the City an annual fee for this service. In considering a centralized management system such as this, it would be important to weigh the considerable financial and administrative costs, the legal issues of City work being conducted on private property,

[1] The adoption of this policy required special state legislation. The *Act Authorizing the City of Gloucester to Contribute Financial Assistance for Certain Septic System Costs* was adopted by the General Court as Chapter 255 of the Acts of 1998 (August 7, 1998).

and the political impact of centralized management against any potential improvements to water quality or reductions in public health threats.

6. Wastewater Goals and Decision Making Process

The recommendations presented in Section 7 are based on the technical evaluations discussed in the previous sections as well as input provided at the public meetings and through other channels. This section outlines the factors that were considered and the process that was conducted to arrive at the recommendations.

6.1 Goals and Principles

At the beginning of the study, Daylor was given a mandate to develop a plan that accomplished several objectives for the Study Area. These included:

- Improving water quality and minimizing pollution in waterways in and near the Study Area;
- Providing a viable solution to the numerous failed on-site wastewater systems within the Study Area;
- Minimizing the cost to homeowners and to the City of providing effective wastewater systems;
- Minimizing the negative secondary growth impacts that might be associated with centralized wastewater systems, and devising strategies to ensure that growth and development are positive changes for the Study Area; and
- Protecting community character within the Study Area to the extent possible.

At the two November community meetings, Daylor posed questions to the participants to identify the relative importance of these goals for the Study Area as a whole and for specific neighborhoods in particular. At these meetings, virtually all participants agreed that preserving the character of the Study Area by protecting open space and limiting development was an important goal. The importance of environmental quality was also almost unanimously agreed upon. Within the neighborhoods with concentrations of failing systems, many residents were concerned about the potential cost of upgrading their system, or about the prospect of not being able to sell their house because of wastewater problems. Summaries of these meetings are presented in Appendix A.

6.2 Weighing Factors

In order to arrive at the wastewater recommendations, Daylor integrated the above goals and factors into a consistent and rational decision-making model. Based on the goals of the study and public input, the highest priority factor in the decision-making model was to rectify existing water quality problems. In terms of the other goals, the recommendations were based on an attempt to maximize the overall benefit for the Study Area. In some portions of the Study Area, the analysis overwhelmingly led to one recommendation. For example, where failing wastewater systems exist, sewer service is readily available and not likely to be

prohibitively expensive, and potential growth impacts are small, the obvious recommendation is to sewer the area.

In areas where the goals were in conflict with one another, alternative scenarios were evaluated in order to determine which scenario would result in a maximization of overall benefit to the Study Area. While there is inherently some degree of subjectivity involved in the weighing of competing goals and factors, the comparison of alternative scenarios generally minimized any subjectivity by identifying the alterative that satisfied as many of the goals as possible. This analysis and the resulting recommendations are summarized in Section 7.

7. Wastewater Plan

Based on the data, analysis, and public input discussed in the first six sections of this report, Daylor developed recommendations as to which sections of the Study Area should be serviced by sewers, community systems, and on-site systems. A set of draft recommendations was presented to the public and the City in early March 2001. During the 30-day public comment period on these draft recommendations, numerous individuals submitted written comments, which provided Daylor with additional information on wastewater problems in certain sections of the Study Area, as well as individual viewpoints. Daylor also conducted additional analysis of soil conditions and growth impacts to answer questions that had been raised during the public review process. Based on this new input and information, the draft recommendations were revised in three primary ways:

1. Some additional areas were added to the recommended sewer service areas based on new information on failing on-site systems in these areas.
2. The role of community septic systems in the plan was reduced because of possible logistical difficulties in siting and building such systems, as well as neighborhood opposition to the systems.
3. The sewer service area was divided into city-funded areas and optional private-funded areas based on the relative priority of sewering different areas.

Figure 5 graphically depicts the final recommendations. Street-by-street recommendations, as well as the rationale for these recommendations, are discussed in Section 7.1. Sections 7.2 and 7.3 present recommendations for implementing the wastewater plan, while Section 7.4 identifies some of the potential impacts of these recommendations.

In developing the recommendations, it became apparent that in certain areas, the recommended wastewater treatment system would depend on the regulatory structure that was in place. In particular, the Private Sewer Rules and Regulations now in effect in Gloucester allow private parties to make sewer extensions to non-abutting properties, which means that a proposed sewer extension may affect not just the street that it serves but also properties within some distance of this street.[1] While this Plan recommends changes to the Private Sewer Rules and Regulations (see Section 7.3), only the City can implement these changes.[2] Because of the importance of the regulatory context and the uncertainty of its final outcome, Daylor developed five classes of recommendations as follows:

[1] Throughout this section, the term "sewer connection" is used to refer to the connection of a lot that abuts and has frontage on the portion of a street in which there is a public sewer. Under state law, property owners who abut the portion of a street in which there is a public sewer are allowed to connect to that sewer. The term "sewer extension" means the construction of additional sewer pipe in a street to serve existing development or new development. The construction of a sewer line to serve any new dwellings that are subject to the Subdivision Control Law would be considered a sewer extension. Sewer extensions are currently allowed in Gloucester under the Private Sewer Rules and Regulations. However, there is nothing in state law that automatically gives private parties the right to construct a sewer extension.

[2] The Private Sewer Rules and Regulations are enacted pursuant to MGL Chapter 83 and could be changed by the Department of Public Works Director.

City Sewer Service Area (City SSA): These areas are a high priority for sewering and are recommended for City-installed public sewer service. Sewer connections and sewer extensions for both existing development and new development should be allowed within this area.

Private Sewer Service Area (Private SSA): These areas are a lower priority for sewering and do not warrant City-installed sewer service. However, existing homeowners or groups of homeowners should be able to build private sewer extensions to service existing development.

Contingent City Sewer Service Area (Contingent City SSA): These areas are a high priority for centralized wastewater treatment service and are recommended for City-installed service. Providing that the Private Sewer Rules and Regulations are modified as recommended in Section 7.3, wastewater treatment service in the Contingent City SSA should be sewer. However, if the Private Sewer Rules and Regulations remain as they are currently written, the potential growth impacts of sewering these areas would be great, and it is recommended that the City provide community wastewater systems for these areas.

Contingent Private Sewer Service Area (Contingent Private SSA): This area is a lower priority for sewering and does not warrant City-installed sewer service. However, private sewer extensions should be allowed in this area.

Individual On-Site System Area: These areas are a low priority for sewering and do not warrant City-installed sewer service. In addition, the potential costs of allowing private sewer extensions outweigh the potential benefits. For these reasons, any area that is not included in one of the four categories listed above is recommended to be served by private on-site septic systems.

7.1 Wastewater Recommendations

The following discussion details the wastewater recommendations and rationale for each section of the Study Area.

7.1.1 Walker Creek and Essex Avenue Area West of Route 128

The following wastewater treatment systems are recommended in the area around Walker Creek and Essex Avenue west of Route 128:

Streets in the City SSA: Essex Avenue, Welch Lane, Woodman Street, Andrews Court, Whipple Woods Road, Forest Lane, Lincoln Street, Sumner Street, Concord Street from Sumner Street to 307/312 Concord Street, Old Bray Street, Overlook Avenue, and Lawrence Mountain Road.

Streets in the Contingent City SSA: Walker Street, Walker Court and Great Ledge Lane.

Rationale

Essex Avenue was included in the SSA because, according to state law (Chapter 83), properties that abut Essex Avenue must be given the opportunity to connect to the sewer main that is proposed for Essex Avenue. Sewer service is recommended for the small streets that are spurs off of Essex Avenue because there are some known or suspected failed systems on these streets and because these areas can be sewered relatively inexpensively by gravity sewers.

A major objective within this area was to improve water quality within Walker Creek. In addition to the houses along Sumner Street and Old Bray Street, which are directly uphill from Walker Creek, effluent sources from Lincoln Street, Walker Street, Walker Court, Overlook Avenue, and the first few houses on Concord Street are believed to contribute to pollution in Walker Creek. All of these streets except Walker Street and Walker Court are included in the City SSA because they can be connected to the sewer system relatively easily and because community systems are not feasible in these areas.

Sewer service is also the preferred solution for Walker Street, Walker Court, and Great Ledge Lane. However, if the Private Sewer Rules and Regulations are not changed, sewering this area could triple the number of new dwelling units that could be built (see Table 10-4). In addition, a community wastewater system may be feasible in this area as a fallback option. Therefore this area is included in the Contingent City SSA.

Centralized wastewater treatment is not warranted on the other streets in this area (e.g., Bray Street, Fernald Street, and the rest of Concord Street) because development is sparse and there are relatively few failing systems.

7.1.2 Southeast of Route 128

The following wastewater treatment systems are recommended in the area southeast of Route 128:

Streets in the City SSA: Essex Avenue, New Way Lane, Larose Avenue, Mt. Ann Road, Kent Road, Eveleth Road, Concord Street from Essex Avenue to Route 128, Laurel Street from Essex Avenue to 32 Laurel Street, and Magnolia Avenue from Essex Avenue to the railroad bridge.

Streets in the Private SSA: West Parish Lane, Landing Road, Presson Point Road, Saville Road, and the rest of Laurel Street.

Rationale

Essex Avenue was included in the SSA because, according to state law (Chapter 83), properties that abut Essex Avenue must be given the opportunity to tie into the sewer main that is proposed for Essex Avenue. Sewer service is recommended for the small streets that are spurs off of Essex Avenue because there are a few known or suspected failed systems on these streets and because these areas can be sewered relatively inexpensively by gravity sewers. Concord Street is included in the SSA because a sewer main is proposed to run up Concord Street to service neighborhoods north of Route 128. In addition, the West Parish School should be sewered, as it may currently be contributing to pollution in the Little River.

The areas recommended for inclusion in the Private SSA have some known or suspected failed systems, but not enough to warrant mandatory City-funded sewer service. Allowing the residents of these areas to decide whether or not they want sewer service will allow them to weigh the potential benefits against the cost of the service and the potential growth impacts.

7.1.3 Concord Street and Atlantic Street Area

The following wastewater treatment systems are recommended in the areas along Concord Street and Atlantic Street:

Streets in the City SSA: Becker Lane, Thompson Street, White's Mountain Road, and Concord Street from Route 128 to Causeway Street.

Streets in the Private SSA: Causeway Street, Ye Olde Country Road, Ann Road, Lily Road, Craft's Road north of Ye Olde Country Road, Cove Way, and Russ Road.

Streets in the Contingent City SSA: Cedarwood Road, Fenley Road, Valley Road, Hilltop Road, Ridgewood Lane, Gull Lane, Brooks Road, Hunter Road, Julie Court, Brooks Lane, Concord Street from Causeway Street to Atlantic Street, and Atlantic Street from Concord Street to Brooks Road.

Street in the Contingent Private SSA: Jones River Road.

Rationale

Four existing neighborhoods off of Concord Street and Atlantic Street are in need of City-installed centralized wastewater treatment systems because they have a high concentration of failed systems and are probably major contributors to water quality problems in the Little River and Jones River. These neighborhoods include the

Becker Lane development, the Cedarwood/Fenley Road development, the Valley Road development, and the Brooks Road development.

Sewering is proposed for the Becker Lane development because a community wastewater system does not appear to be feasible in this area. Sewering is also the preferred solution for the other three neighborhoods. However, if the Private Sewer Rules and Regulations are not modified as suggested in Section 7.3, the potential growth impacts of extending sewer to these areas could be significant (see Table 10-4). In addition, community wastewater systems may be feasible in this area as a fallback option. For these reasons, the Cedarwood/Fenley, Valley Road, and Brooks Road neighborhoods are included in the Contingent City SSA.

Rust Island has some known or suspected failed systems, but not enough to warrant mandatory City-funded sewer service. Extending the sewer to Rust Island could have moderate growth impacts, even if sewer extensions are not allowed for new development (sewer connections would still be allowed under state law). Allowing the residents of these areas to decide whether or not they want sewer service will allow them to weigh the potential benefits against the cost of the service and the potential growth impacts.

Jones River Road is recommended as a Contingent Private SSA because this area may be suitable for the development of affordable housing. If so, sewer service would be desirable to maximize the development potential and minimize the cost of such housing. Because the City owns virtually all of the land on Jones River Road, it will be up to the City and its residents (not a private party) to determine whether or not Jones River Road will be sewered and developed.

The Contingent City SSA ends at the Brooks Road neighborhood because beyond this point on Atlantic Street there are no significant concentrations of failed systems that are contributing to persistent water quality problems. Extending the sewer further along Atlantic Street could also allow significantly more development to occur in this environmentally sensitive area. (Potential growth impacts of this scenario are presented in Table 10-4.)

Daylor investigated the possibility of building a community septic system or a small wastewater treatment plant to service the Wingaersheek neighborhood, but concluded that these alternatives were not practical or economically feasible for several reasons. Multiple septic systems would be required to treat the volume of wastewater from this neighborhood since the total flow could approach 70,000 gpd (212 households times a design flow of 330 gpd per household) and each system must be less than 15,000 gpd. There is insufficient land in the area to provide enough leaching fields for this number of septic systems or this amount of wastewater. A small wastewater

treatment plant might be feasible from an engineering standpoint but would require an ocean discharge permit, which would be extremely difficult or impossible to obtain.

7.1.4 Other Areas

Any areas not mentioned above are recommended to be served by on-site systems. The rationale for not providing centralized wastewater treatment service to these areas is based on one or more of the following three reasons:

1. **Existing Development is Sparse:** In many of the areas not recommended for centralized wastewater systems, residential lots are generally large, development is sparse, and there are not concentrations of failed systems. Providing sewers or community systems to such areas is uneconomical because there are few households to share the cost of the conveyance system. In addition, sewering rural sections of the Study Area could have very significant negative growth impacts by encouraging development on lots that are now constrained by rock, ledge, topography or other constraints. Areas with sparse development include Concord Street, Bray Street, and Fernald Street.

2. **Existing Systems are Functional:** In areas where most or all of the on-site systems have passed Title 5 or are functioning properly, centralized wastewater treatment is not needed in order to rectify water quality problems or provide a solution to failed systems. In these areas, centralized wastewater systems can be construed as a wasteful expenditure and are ranked as a low priority. Areas with functional systems include the Castle View development and most of the sparsely developed areas mentioned above.

3. **Some Failed Systems Exist, But the Liabilities of Sewering Outweigh the Benefits:** In the Wingaersheek neighborhood, there are some failed systems, but these systems constitute a small percentage of the total and have not been identified as contributing to persistent water quality problems. For this reason, they are rated as a less pressing problem than some of the neighborhoods that drain directly to Walker Creek, Little River, or Jones River. As discussed above, community wastewater systems are probably not feasible, and sewering would entail considerable expense as well as the potential for additional growth along Atlantic Street. In addition, sewering the Wingaersheek neighborhood could promote additional development in environmentally sensitive areas.

For areas where on-site wastewater systems are recommended, the City should continue its centralized management programs, which are discussed in Section 5.3. One important program assists homeowners with the cost of repairing or replacing an on-site wastewater system. The City provides zero-interest loans for septic system

upgrades or replacements, with 25% of the cost of the loan paid by the City, up to $6,000 per property.

In addition to these grants and loans, the City, through its Health Department, should consider providing additional technical assistance to homeowners who have on-site wastewater systems. Educational materials could be provided on system management and maintenance to improve the performance and extend the useful lifetime of existing on-site systems. The City could hold periodic evening seminars for homeowners seeking to build, upgrade, or replace an on-site system. The goal of these programs should be to reduce the cost and hassle of septic system work for homeowners.

7.2 System Construction, Management and Maintenance

Additional study of local subsurface conditions must be undertaken before the recommended systems can be designed and constructed. However, the following general recommendations are offered as guidelines:

- Where topography allows, gravity sewers are recommended, as they are generally the easiest systems to install and maintain.
- In hilly and/or rocky locations, pressure systems appear to be the most cost-effective solution, and are recommended. In hilly and/or rocky locations, cost comparisons indicate that gravity sewers can cost four to five times as much as pressure sewers.
- If the Private Sewer Rules and Regulations are not modified, and community wastewater systems are built in the Contingent City SSAs, the City should build and maintain the community system and assess an annual fee to its users, similar to a sewer fee.
- For areas where on-site systems are proposed, we recommend that the City review its programs for assisting homeowners with upgrades that are required under Title 5 and the local Board of Health of regulations. The objective of this review should be to ensure overall consistency and fairness throughout the Study Area.
- Regarding systems that have failed Title 5 but are proposed to be replaced with sewer, the City should adopt an appropriate policy that protects water quality and public health without requiring needless system upgrades on lots that will soon be sewered. During the interim period until the proposed centralized wastewater management systems are built, the City should continue its management program for on-site systems.

7.3 Recommended Regulatory Changes

As discussed previously, Gloucester's Private Sewer Rules and Regulations will influence the outcome and efficacy of this Plan to a significant degree. We recommend that these Rules and Regulations be modified to prohibit any sewer extensions outside of the SSAs and Contingent SSAs shown in Figure 5. Within the City SSAs and the Contingent Private SSA sewer extensions should be allowed for new development in order to promote land use objectives for the Study Area. See Section 12.1 for further discussion.

To enforce these recommendations, a new sewer regulation should also be enacted that has the following two purposes:

1. To reserve sewer capacity for the purpose of correcting existing problems.
2. To prevent uncontrolled growth which exceeds the City's capacity to provide water, schools, and other infrastructure, or which degrades natural resources.

The regulation should specify the following:

- Any lot within the SSAs or Contingent SSAs has the option of connecting to the sewer.
- No lot that lies outside of the SSAs or Contingent SSAs may connect to the sewer, even with a private extension.

7.4 Potential Impacts of this Plan

The above wastewater recommendations will have several impacts on the Study Area and the City as a whole. Most of these impacts will be positive, but a few may be negative. Impacts may include:

Cost: The City will need to fund the proposed wastewater infrastructure. Detailed cost estimates are beyond the scope of this report and will need to be prepared as part of the design process for the recommended systems.

Water Quality: The Plan is expected to improve significantly water quality in Walker Creek, Little River, and Jones River by eliminating the largest point and nonpoint sources of pollution to these waterways. However, future growth in the Study Area could undermine these improvements by introducing additional nonpoint pollution into these waterways.

Homeowner Cost, Value and Convenience: In areas where centralized wastewater infrastructure is recommended, homeowners will have some initial cost associated with betterments for tying into the systems. The City will determine the amount of these betterment fees. However, in the long run, the availability of centralized wastewater infrastructure will likely increase property values for lots that have access to this

infrastructure. In addition, centralized wastewater systems will eliminate the need to undertake costly upgrades of on-site systems for many homeowners.

Growth and Development: The potential growth impacts of the recommended wastewater plan are shown in Table 10-4. Minimizing negative secondary growth impacts has been an important component of this Plan, and, for the most part, the recommendations avoid providing sewer service to buildable land in rural or environmentally sensitive areas. Significant growth potential will be created along Essex Avenue as a result of the recommended sewering. However, this growth is generally consistent with the land use objectives for the Study Area, as discussed in Section 12. The impacts of growth in the Essex Avenue corridor could be positive or negative, or both. It is up to the City to enact appropriate land use regulations that direct this growth into desirable patterns, consistent with the recommendations of this report.

Negative impacts from unplanned growth are likely to be much greater if the Private Sewer Rules and Regulations are not modified. Poorly planned growth and development can contribute to several negative impacts, such as the need for additional public facilities and services (schools, roads, water supply, etc.), fiscal impacts to the City, loss of open space, and the potential degradation of natural resources.

8. Existing Land Use and Open Space

In order to evaluate land use needs, options, and potential recommendations, Daylor conducted a quantitative analysis of land use, open space, development constraints, and development potential within the Study Area. The Study Area contains approximately 4,241 acres of land, or about one-fourth of Gloucester's 16,620 acres. Section 8 provides an inventory of existing conditions within the Study Area. Section 9 discusses existing land use regulations that apply within the Study Area. Section 10 discusses the potential for new growth within the Study Area.

8.1 Inventory of Developed Land Use

The land use information presented in this report is current as of 2000 and is derived from several sources. The most recent land use information available from MassGIS[1] is based on 1991 aerial photography. In 1998, the Metropolitan Area Planning Council (MAPC) updated the land use data layer as part of their work in preparing a buildout analysis for Gloucester. The 1998 update included new development that occurred during the 1990s as well as approved subdivision proposals. Daylor updated this 1998 data to include actual subdivisions that have been built or are under construction. In addition, Daylor rectified the land use data layer so that it conformed to the parcel boundaries.[2]

Developed land uses as of 2000 are summarized in Table 8-1 and shown in Figure 6.

[1] MassGIS is the state's office of geographic and environmental information and distributes geographic data for Massachusetts.

[2] Daylor rectified the extent of the various developed land uses so that they coincided with the boundaries of the parcels on which they are located. This rectification was necessary in order to calculate more precise buildout estimates for each section of the Study Area. In situations where the parcel was large enough to be subdivided into additional lots in the future, only that portion of the lot that is actually developed and/or would be required to be counted as a minimum lot area under current zoning was indicated as being developed.

Table 8-1: Developed Land Uses (2000)

Land Use	Acres	% of Study Area
High & Medium Density Residential	242.3	5.7%
Low Density Residential	626.2	14.8%
Approved Subdivisions	162.7	3.8%
Subtotal Residential	**1031.3**	**24.3%**
Commercial	11.1	0.3%
Industrial	3.4	0.1%
Subtotal Commercial and Industrial	**14.5**	**0.3%**
Other[3]	**57.7**	**1.4%**
Total Developed Land	**1103.5**	**26.0%**

8.2 Inventory of Open Space

Open space information presented in this report is based on the MassGIS open space data layer as well as the Gloucester Assessor's database. Table 8-2 and Figure 7 provide a summary of protected and unprotected open space lands in the Study Area. Protected open space is permanently protected from development by virtue of a conservation restriction or ownership by a conservation organization. Protected open space in the Study Area includes land owned by the Essex County Greenbelt Association as well as City of Gloucester lands held for watershed protection purposes.

Unprotected open space is land that currently functions as open space but could be developed in the future because it is not protected by a permanent legal mechanism. Table 8-2 only identifies unprotected open space owned by public or institutional landowners. In addition to the unprotected open space listed in Table 8-2, there are numerous parcels of undeveloped land in private ownership that could be considered unprotected open space. It is important to note that any City-owned parcel that is not specifically designated as conservation land could be developed in the future or could be sold or transferred to a private party who could develop it.

[3] Includes public buildings, developed recreation uses, roads (Route 128 only), and waste disposal.

Table 8-2: Protected and Unprotected Open Space

Ownership (Status)	Acres	% of Study Area
City of Gloucester (Protected)	149.0	3.5%
Essex County Greenbelt Assn. (Protected)	650.8	15.3%
Other (Protected)	1.0	0.0%
Subtotal Protected Open Space	**800.8**	**18.9%**
City of Gloucester (Unprotected)	228.6	5.4%
Private Nonprofit (Unprotected)	39.9	0.9%
State of Massachusetts (Unprotected)	26.4	0.6%
Subtotal Unprotected Open Space	**294.8**	**7.0%**
Total Open Space	**1095.6**	**25.8%**

8.3 Inventory of Wetlands and Other Regulated Areas

Wetland information presented in this report is the same as the wetland data that MAPC used for its 1998 Buildout Analysis. Wetlands are a significant development constraint because federal, state and local wetland protection laws restrict or prohibit development in and near wetlands. Table 8-3 provides an inventory of wetlands within the Study Area by type, including open water, coastal bank, freshwater wetland, salt marsh, beaches and dunes.

Table 8-3: Inventory of Wetlands

Wetland Type	Acres Within Protected Open Space	Acres Outside Protected Open Space	Total Acres
Open Water	6.3	19.2	25.5
Coastal Bank	4.4	29.9	34.3
Freshwater Wetland	66.4	134.7	201.1
Salt Marsh	214.8	634.0	848.8
Beach and Dune	70.4	136.3	206.8
Total Wetlands	**362.3**	**954.1**	**1316.5**
Uplands	438.3	2486.6	2924.9
Total Land Area	**800.7**	**3440.7**	**4241.4**
(Tidal Flats)			(478.1)

Other regulated areas include the riverfront area (a 200-foot buffer on either side of perennial streams – see Section 4.3.1) and the Parker River/Essex Bay ACEC (see Section 4.3.3). These constraints are considered as part of the buildout analysis (see Section 10).

8.4 Housing

The shortage of affordable housing in Massachusetts has been cited as a statewide concern. A variety of factors have resulted in an increasingly unaffordable housing market. These factors include changes in public housing and subsidy programs; the conversion of affordable housing to higher-end housing (often referred to as "gentrification"); developers' overall preference for constructing more profitable high-end housing rather than affordable housing; and building, land use, and environmental regulations that increase the cost of building and rehabbing housing units.

In Gloucester, affordable housing is critical not only to maintain the City's broad economic base, which includes sectors with a significant proportion of lower-paying jobs, but also to allow local employees such as teachers and city workers to live in Gloucester. According to Plan2000, businesses, city government, and the public schools in Gloucester report that selected job candidates sometimes do not accept jobs or do not stay because they cannot find affordable housing in the community.

As part of this study, Daylor assessed the affordability of housing within the Study Area and identified unmet housing needs. This information was considered in formulating the overall land use recommendations presented in Section 12.

8.4.1 Affordable Housing Conditions and Initiatives in Gloucester

Housing affordability is defined in relation to household income for the target population. Generally, affordable housing is housing that costs no more than 30% of a household's total income. For example, an affordable housing unit for a household earning $50,000 per year would cost no more than $15,000 per year, which corresponds to a monthly rent or monthly mortgage payment of $1,250.

Citywide, 623 of Gloucester's approximately 13,100 housing units are state or federal public housing and an additional 609 units are subsidized rental units.[4] Statistics for public housing and subsidized housing specifically for the Study Area are not available.

State law (MGL Chapter 40b) mandates that 10% of each community's total housing is affordable to and dedicated to households with low and moderate incomes. In order to qualify as affordable under Chapter 40b, housing units must be subsidized with state or federal funding or qualify under the Local Initiative Program. Not all affordable units qualify under Chapter 40b and count toward a community's required 10%. As of 1997 (the most recent estimate), approximately 6.2% of Gloucester's

[4] Affordable housing information is from the MA Department of Housing and Community Development, 1999. The citywide housing figure is from the Gloucester Community Development Department, current through the end of 2000.

housing stock meets Chapter 40b requirements.[5] When communities have less than 10% affordable housing, Chapter 40b allows private developers who construct affordable housing to circumvent local zoning and subdivision control regulations through the Comprehensive Permit process. This process allows developers to submit a single application to the Zoning Board of Appeals, and requires that the application must be approved unless it presents serious health or safety risks.

Gloucester has several public and non-profit programs to provide affordable housing throughout the City. The Gloucester Grants Office administers the Community Development Block Grant (CDBG) money, which provides funds to assist in the development and maintenance of affordable housing, including septic systems and sewer connections. Part of the CDBG money is used for the First-Time Homebuyers Program, which provides down payment and closing cost assistance of up to $8,500 for eligible buyers. Since the inception of this program in 1995, the Grants Office has assisted over 100 homebuyers.

The Gloucester Housing Authority provides federally subsidized and assisted housing as well as vouchers for rental assistance. The Community Land Trust of Cape Ann is a private non-profit agency that develops housing units and sells them for below market rate to people who could not otherwise buy a home. To be eligible to buy one of the units, a family must earn less than 80% of the area median income, adjusted for family size, and must have lived or worked in Gloucester, Rockport, Ipswich, Essex or Manchester for at least a year. The Community Land Trust retains ownership of the land on which the housing units are located in order to ensure that the units remain affordable in perpetuity, even when they are resold. Other non-profit agencies active in Gloucester provide housing for the homeless, families in transition, and those requiring special services.

8.4.2 Housing Affordability Within the Study Area

In order to identify affordable housing issues and needs, a housing affordability analysis was conducted for the Study Area through the following steps:

1) Estimating the median household income for the Study Area.
2) Determining the monthly mortgage payment or monthly rent that would be considered "affordable" for persons in different income brackets.
3) Determining the price of a house that would be considered "affordable" for persons in different income brackets by translating the monthly mortgage payment into home sale price. (Rental units were not evaluated since there are few rental units within the Study Area and accurate rental price information was not readily available.)

[5] MA Department of Housing and Community Development.

4) Determining the number and percentage of housing units within the Study Area that are affordable to each income bracket.

The 2000 median household income for the census tract that contains the Study Area is estimated to be approximately $49,825.[6] Accordingly, thresholds for housing affordability in the Study Area for households of various income levels (assuming that no more than 30% of household income should be devoted to housing costs) are as follows:

Table 8-4: Housing Affordability Criteria

Household Income Level (% of median household income)	Maximum Annual Income	Maximum Monthly Payment	Maximum House Price[7]
Very Low Income (less than 50%)	$24,910	$623	$109,650
Low Income (up to 80%)	$39,860	$997	$175,470
Moderate Income (up to 120%)	$59,790	$1,495	$263,120
Upper-Middle Income (up to 160%)	$79,720	$1,993	$350,770
Upper Income (more than 160%)	>$79,720	>$1,993	>$350,770

Table 8-5 indicates the number and percentage of housing units in the Study Area that are considered affordable to each of the five income levels identified above.

Table 8-5: Housing Affordability in the Study Area[8]

House Price (approx.)	Suitable For Income Levels (% of median income)	Number of Units	% of Total Units
<$109k	Very Low Income (<50%)	46	4%
$109-175k	Low Income (50-80%)	345	31%
$175-263k	Moderate Income (80-120%)	335	30%
$263-351k	Upper-Middle Income (120-160%)	179	16%
>$351k	Upper Income (>160%)	224	20%
TOTAL		**1129**	**100%**

[6] Because current household income figures for the Study Area were not available (2000 census information on this topic has not yet been released), household income was estimated. This figure was calculated by using the 1990 U.S. Census figures to compare median household income for census tract 2219 (which contains the Study Area) to median family income in the Boston Metropolitan Statistical Area. The 1990 figures for census tract 2219 were then extrapolated to year 2000 based on the proportional increase in median family income for the Boston MSA from 1990 to 2000.

[7] Based on National Association of Realtors Housing Affordability Index for December 2000. Assumes a 20% down payment.

[8] Source: 2000 Gloucester Assessor's Database. Based on standard practice, assessed value was assumed to be 93% of actual value.

Table 8-6 provides a breakdown of the price of housing units by number of bedrooms.

Table 8-6: Housing Price by Number of Bedrooms

Number of Bedrooms	# of Units	% of Total Units	Median Price
1	61	5%	$100,753
2	279	25%	$150,000
3	527	47%	$227,097
4	198	18%	$405,000
5+	64	6%	$758,817
TOTAL	**1129**	**100%**	**$215,376**

As shown in Table 8-5, a large percentage of the Study Area's housing stock is affordable to low and moderate income households. However, the data in Table 8-6 suggest that many of the affordable housing units are smaller 1- and 2-bedroom units, as well as some 3-bedroom units. In addition, there are very few housing units within the Study Area that would be affordable to very low income households.

8.4.3 Housing Issues and Opportunities Within the Study Area

Although the Study Area's current housing stock generally provides housing opportunities for most income levels (except very low income households), this situation could change quickly as a result of several factors. First, housing trends within the Study Area in recent years have favored the development of very expensive large houses on large lots. The recent development of the Castle View subdivision is one example of this trend. In locations where sewer service will not be available, the high cost of installing a septic system alone will dictate expensive housing prices.

Second, land prices in the Study Area have increased significantly, and are likely to increase further, particularly in areas where sewer service will become available. Finally, the extension of sewer service into existing neighborhoods of smaller houses (such as Becker Lane and Valley Road) may allow homeowners to add significant additions and expansions to their homes. When these houses are sold to a new owner, there is even the potential to tear down the existing house and build a new, larger house. Such conversions and "teardowns" have occurred extensively in desirable communities in the Boston area and almost always result in the replacement of affordable housing with more expensive housing.

Given these factors, it will require a considerable effort on the part of the City if the Study Area is to remain an affordable place to live for families of various income levels. While the introduction of sewer is a threat to housing affordability in one

regard, it is also a potential benefit. The sewer will significantly reduce the cost of wastewater treatment for new development (compared to installing a new septic system), allow development on smaller lots, and provide the City and private parties with a wider range of options for building affordable housing.

Maintaining housing affordability will require increasing the available housing supply across many sectors of the market. To some extent, the goal of providing affordable housing may come into conflict with the goal of minimizing growth and its impacts. Recommendations and policies to balance these two important goals in the Study Area are presented in Section 12.

8.5 Transportation

Travel by private automobiles is the primary means of transportation to, from, and within the Study Area. The road network consists of three main local streets—Essex Avenue (Route 133), Concord Street, and Atlantic Street/Atlantic Avenue—as well as Route 128. The road network is such that most of the residential streets feed directly into one of these three main streets. With the exception of Essex Avenue and the Castle View subdivision, virtually all of the streets in the Study Area are quite narrow, curvy, and/or hilly given their functional classification. Many of the smaller residential streets are very narrow, and care is required when two cars pass one another.

Many of the residents attending the public meetings for this project indicated that the Study Area's narrow, scenic, tree-lined roads are an important character-defining feature for the area. However, it is important to recognize that many of the existing roadways in the Study Area could not be built today because they would not conform to safety and design standards or to the City's Subdivision Rules and Regulations.

Public transportation in and near the Study Area is available, but limited. The Cape Ann Transit Authority (CATA) runs a bus from West Gloucester to downtown Gloucester several times a day, Monday through Saturday. The bus runs along Essex Avenue, with some routes also traveling along Bray Street, Concord Street, and Atlantic Street. CATA also offers a Dial-A-Ride service for the elderly and disabled. The West Gloucester MBTA Commuter Rail station is located just east of the Study Area on Essex Avenue and provides regular service southbound to Boston's North Station and northbound to Rockport. Public parking for 44 vehicles is available at the station.

In general, the Study Area is not very conducive to pedestrian or bicycle travel. Most roads have no shoulders or sidewalks for pedestrians and bicycles, and the curviness and hilliness of many roads results in limited sight lines that can make walking and bicycling dangerous. On the other hand, since there are not many destinations in or near the Study Area that could be readily accessed on foot or by bicycle, the lack of such facilities may not be a serious

problem. Additional pedestrian or bicycle facilities to access the West Parish School or the beach, or for recreational purposes, might be beneficial.

9. Land Use Regulations

Gloucester's zoning ordinance and other land use regulations determine how land may be used and developed within the Study Area. These regulations were an important factor to consider in preparing the wastewater management plan since they affect the extent to which new wastewater infrastructure could act as a catalyst for addition growth and development. In addition, the current land use regulations are the starting point from which the land use recommendations were developed. This section discusses the City's zoning ordinance, subdivision rules and regulations, and other provisions.

9.1 Base Zoning Districts

Zoning districts for the Study Area are shown in Figure 8. Below is a brief description of the intent, allowed uses, and maximum intensity of development in each zoning district.

- **Rural Residential (R-RB):** This district is intended for areas of the City which lack services and good access, and allows single-family and two-family residential development with a minimum of 80,000 square feet per dwelling unit. Rural portions of the study area north of Concord Street and north of Bray Street are zoned R-RB.
- **Rural Residential (R-RA):** This district allows single-family and two-family residential development with a minimum of 40,000 square feet per dwelling unit. A large portion of the study area is zoned R-RA, including land south of Concord Street and off of Bray, Fernald, Walker, and part of Sumner Streets.
- **Low Density Residential (R-2A):** This district allows single-family and two-family residential development with a minimum of 30,000 square feet per dwelling unit. Within the study area, the R-2A district applies to land on both sides of Laurel Street.
- **Low Density Residential (R-2):** The R-2 district allows single-family and two-family houses on lots of 20,000 square feet or more. Multi-family housing is allowed by special permit, with a minimum requirement of 10,000 square per dwelling unit. The R-2 district encompasses the Wingaersheek Beach area as well as land along the Annisquam, Jones and Little Rivers, extending inland to include existing neighborhoods on either side of Atlantic Street and Concord Street.
- **Medium Density Residential (R-3):** The R-3 district includes land on both sides of Essex Avenue from Route 128 to the Essex border, as well as most of Rust Island. Within the R-3 district, single-family and two-family dwellings are allowed on lots of at least 10,000 square feet. Multi-family housing is allowed by special permit, with a minimum requirement of 2,000 square per dwelling unit.
- **Neighborhood Business (NB):** Within the study area, the NB district includes two small areas along Essex Avenue west of Fernald Street and a larger area on the southeastern corner of Essex Avenue and Laurel Street. The NB district is intended to accommodate a variety of retail businesses primarily offering convenience shopping

for nearby residential areas. The dimensional requirements in any given NB-zoned area are the same as those in the least restrictive abutting residential district.

- **Extensive Business (EB):** The EB district is located in areas with good highway accessibility and exposure and is intended to accommodate business, retail and service uses serving a city-wide clientele. In the study area, this includes land near interchanges 14, 13 and 12 off of Route 128. Allowed uses include banks, offices, restaurants, retail and other business uses. Shopping centers require a special permit from the City Council. The minimum lot size in the EB district is 10,000 square feet.
- **General Industrial (GI):** The GI district is intended primarily for manufacturing, assembling, processing and other industrial uses, but it also allows certain business establishments such as offices, restaurants, and retail uses (under some circumstances, retail uses require a special permit). The GI district is intended for areas on arterial or collector streets that are not residential in character. Within the study area, land adjacent to interchange 13 and along Causeway Street is zoned GI. The minimum lot size in this district is 10,000 square feet.

Zoning within the Study Area is predominantly residential, with more than half of the land area devoted to low-density Rural Residential uses. Table 9-1 provides the approximate acreage within each zoning district in the Study Area.

Table 9-1: Zoning Within the Study Area

Zoning District	Acreage	% of Study Area
R-RB (Rural Residential)	1,133	26.7%
R-RA (Rural Residential)	1,250	29.5%
R-2A (Low Density Residential)	88	2.1%
R-2 (Low Density Residential)	1,353	31.9%
R-3 (Medium Density Residential)	325	7.7%
NB (Neighborhood Business)	8	0.2%
EB (Extensive Business)	52	1.2%
GI (General Industrial)	32	0.8%
TOTAL	**4,241**	**100.0%**

The acreage figures in Table 9-1 reflect several zoning changes that went into effect in 1999. Prior to 1999, 695 acres of land in the Atlantic Street corridor that is now zoned R-2 was zoned R-3. In addition, the 1250 acres of land southwest of Concord Street that is now zoned R-RA was zoned R-2.

9.2 Overlay Districts

Overlay districts provide an additional level of regulation in addition to the base zoning districts. Two overlay districts are relevant within the Study Area.

The Lowland Requirements, outlined in Section 5.5 of the Zoning Ordinance, apply to all land in the Study Area that lies below ten (10) feet elevation relative to the U.S.G.S. datum (also known as the National Geodetic Vertical Datum [NGVD] of 1929). These requirements are in addition to the underlying zoning. The Lowland Requirements prohibit the issuance of a building permit for a principal building unless the City Council issues a Special Permit providing an exception. The Special Permit application must demonstrate that the proposed development will not pose a hazard to the health or safety of its occupants. Earth removal, filling or dredging is also prohibited without a Special Permit from the City Council.

The Watershed Protection Overlay District (Section 5.10 of the Zoning Ordinance) is intended to protect the City's water supply, and the tributaries that feed this supply, from any potentially harmful land development or building construction. The district includes all lands lying adjacent to water courses and surface water bodies that contribute to the City's water supply and overlays other established zoning districts. A small portion of the Study Area (parts of the southeastern edge of the Study Area) is included in the Watershed Protection Overlay District, which is shown on a map available from the Gloucester Planning Department.

9.3 Other Provisions

Several other provisions affect the manner in which growth and development may occur within the Study Area. These include:

- **Cluster Development:** Cluster development allows a developer to "cluster" houses on one portion of site at a higher density than would ordinarily be allowed in exchange for setting aside a separate portion of the site as protected open space. Clustering is intended to create development that is more environmentally and aesthetically sensitive and that uses land in a more efficient manner. Cluster development is allowed by special permit in all of the residential zones within the Study Area.

  Development density allowed in cluster developments is determined by dividing the total parcel area by 90% of the normal minimum area requirement. This requirement would appear to allow a greater number of units in a clustered development than in a non-clustered development. In addition, the Planning Board may authorize a density bonus of up to 20% if the developer provides affordable housing and/or a conservation restriction on the open space. Cluster developments must provide at least 30% of the site as open space, not including wetlands and other restricted areas.

  Despite the apparent incentives for developers to build cluster developments, Gloucester's cluster zoning ordinance must be considered unsuccessful thus far since a cluster development application has not been submitted in Gloucester in ten years.

In the past few years, the City has focused some attention on revising its cluster development provisions. See Section 12.2 for additional discussion.

- **Inclusionary Housing Requirements:** In any multi-family residential development with 11+ dwelling units or 21+ bedrooms, 10% of the total dwelling units created must be made permanently affordable for families of three earning 80% of the median income for the area, as defined in the Zoning Ordinance. As an alternative, the developer may build affordable housing units off-site, or may make a cash contribution to the City to be used for affordable housing construction.
- **"Pork Chop" Lots:** The Zoning Ordinance allows that lots which lack the minimum required lot frontage may nevertheless be developed under certain circumstances. Development of such "pork chop" shaped lots is allowed by special permit from the Planning Board providing that the lot is at least two times the minimum area ordinarily required in the zoning district where the lot is located and its width is at least 40 feet in all places.
- **Common Driveways:** Common driveways can reduce the visual and traffic safety impacts of curb cuts by consolidating multiple residential accesses into a single driveway. The Zoning Ordinance allows common driveways for 2-4 residential lots with a special permit from the Planning Board. Common driveways are sometimes used to allow land that could not otherwise be developed to be built upon, and for this reason have generated opposition from some area residents.
- **Review for "Major Projects":** The Zoning Ordinance requires project review for "Major Projects," including multi-family housing with 11+ dwelling units or 21+ bedrooms, lodging establishments with 30+ guest units, and shopping centers. Criteria for approval of major projects include access, sewage disposal, and compatibility with nearby residential areas. Shopping centers must also satisfy criteria related to transportation impacts, site entrances and egresses, stormwater, lighting, landscaping, screening and signage.

9.4 Subdivision Rules and Regulations

The Rules and Regulations Governing Subdivision of Land are adopted under the Massachusetts Subdivision Control Law (M.G.L. Chapter 41, Sections 81K through 81GG) and administered by the Planning Board. Several provisions within these Rules and Regulations are relevant to infrastructure and land use planning in the Study Area. In particular:

- For new subdivisions, connection to public sewers is required if any portion of the subdivision is within 1000 feet of the public sewage system, as measured along a street or way, or if the Board of Health requires a connection. The developer must make the sewer connection at his or her own expense. If a public sewage system is included in the City's five year Capital Improvement Program but is not yet

constructed, the developer is required to build sewerage laterals which can be connected to the public system later, when it is built.

- New subdivisions must be connected to an existing water main at least 8 inches in diameter.
- New subdivisions within 1000' of a city storm drain must tie into the storm drain at the developer's expense.
- Sidewalks are required on both sides of collector and minor streets. The Planning Board may require sidewalks on lanes or courts at its discretion. The Planning Board may also require bikeways, pedestrian walkways, or bridle paths.
- When appropriate, developers are encouraged to use common driveways to provide access for up to four abutting lots as a way of minimizing the number of curb cuts and stormwater runoff.

10. Potential for Growth

In addition to examining existing land use patterns and land use regulations, Daylor analyzed the potential for future growth within the Study Area. This information provides insight into how the Study Area could change and develop in the future as a result of current policies and development patterns. To the extent that this future change is incompatible with the expressed goals of the City and the community, new policies can then be adopted that channel growth and change into more appropriate patterns. The analysis of growth potential was conducted using both quantitative methods (the buildout analysis) and qualitative methods, as described below.

10.1 Previous Growth and Development

Existing development within the Study Area dates from several different periods in time. Many of the established neighborhoods in the Study Area were built during the middle part of the 1900s and consist of relatively small houses on relatively small lots. Since 1980 or so, as a result of more restrictive environmental, wastewater and zoning regulations, as well as market preferences, most of the new development has consisted of larger, more expensive houses (for example, Castle View and Mathieu Hill Road).

Building permit data from the City indicate a significant rate of growth in Ward 5-2 in recent years. From 1995 through 2000, the City has issued anywhere from 11 to 24 building permits per year in Ward 5-2. The total number of permits issued from 1995-2000 is 105, which represents about 10% of the dwelling units in the Study Area. By contrast, a total of 394 building permits were issued citywide during this period, which represents about 3% of the total dwelling units in the City.

10.2 Buildout Analysis

A buildout analysis is an attempt to answer the question:

> *How much new growth can this area accommodate if all the buildable land is developed in accordance with the current zoning, and what are the potential impacts of this growth?*

Answering this question is important for several reasons: First, the buildout analysis determines how much of the Study Area's land is developed, how much is legally or environmentally constrained, and how much is available for new development. Second, the buildout analysis provides a clear picture of where the Study Area may be headed, which can help its residents and the City evaluate whether it is headed in the right direction. If the buildout scenario is undesirable, the City will know that the zoning should be modified so that it more closely resembles the desired future character for the Study Area. Finally, the buildout analysis estimates the possible impact of new development in terms its demand on municipal services, environmental resources, and transportation infrastructure. This

information can help in the fiscal and physical planning of new facilities to accommodate future development.

The Metropolitan Area Planning Council (MAPC) initially prepared a buildout analysis for the entire City of Gloucester in 1998. MAPC subsequently updated this analysis in 2000 to account for the 1999 zoning changes and so that the buildout analysis would conform to the Executive Office of Environmental Affairs' standards and requirements.[1] Daylor then obtained GIS datalayers from MAPC in order to customize the 2000 MAPC buildout analysis for the Study Area.[2]

Concerning the MAPC buildout analysis methodology, there are three important issues to recognize. First, the methodology does not consider upland areas of poor soil or ledge as a development constraint. For this reason, some areas that are identified as "developable" may in fact not be buildable at the maximum allowed density, or at all, because of environmental conditions which preclude the siting of a septic system. Second, the buildout analysis only considers the potential for new development, not for redevelopment. Third, it should be noted that the buildout analysis provides a picture of the ultimate (final) developed state of an area; it does not attempt to determine the rate of future development, or how quickly buildout will be reached.[3]

The buildout analysis consisted of four steps:

1. Determine the amount of developable land in the Study Area. This number is calculated by subtracting from the total land area all lands that are already developed or are unavailable for development for a variety of reasons. The resulting areas of buildable land are shown in Figure 9.

[1] Between 1999 and 2001, the MA Executive Office of Environmental Affairs (EOEA) commissioned buildout analyses for all 351 Commonwealth communities and developed a standard methodology and presentation format for use statewide. For more information on this methodology, contact MAPC or EOEA.
[2] This process involved first rectifying the land use data layer based on land ownership patterns in order to reflect more accurately the buildout potential within the Study Area. The methodology of the MAPC analysis was then repeated in order to arrive at the buildout analysis for the Study Area.
[3] Because development in Gloucester is closely tied to regional and national market conditions, it is difficult to predict how rapidly development may occur. In many communities, historical rates of development may provide a reasonable proxy for future development rates, at least for the near term. Within the Study Area, however, the prevalence of septic constraints call this assumption into question.

Table 10-1: Constraints to Development

Land Area	Acres	% of Study Area
Total Study Area	**4,241**	**100.0%**
- Already Developed Land[4]	- 1,104	- 26.0%
- Protected Open Space	- 801	- 18.9%
- Wetlands[5]	- 921	- 21.7%
- First 100' of Riverfront Area[6]	- 61	- 1.4%
Potentially Developable Land	**1,354**	**31.9%**

2. Determine the amount of the total developable land that is within each zoning district (see Table 10-2).

3. Determine the intensity of development allowed in each zoning district under current zoning.[7] Multiply these intensity formulas by the total amount of buildable land in each district to arrive at the overall residential, commercial and industrial buildout.

Table 10-2: Buildout Summary

Zoning District	Developable Acres	Buildout Formula	Buildout Capacity
R-RB (Rural Resid.)	232	0.468 d.u./acre	109 d.u.
R-RA (Rural Resid.)	595	0.893 d.u./acre	532 d.u.
R-2 (Low Density Resid.)	336	1.742 d.u./acre	586 d.u.
R-2A (Low Density Resid.)	18	1.205 d.u./acre	22 d.u.
R-3 (Medium Density Resid.)	144	3.267 d.u./acre	470 d.u.
Total Residential Buildout	**1,325**		**1,719 d.u.**
N-B (Neighborhood Bus.)	4.5	0.45 FAR[8]	88,000 s.f.
E-B (Extensive Bus.)	15.6	0.45 FAR	306,000 s.f.
G-I (General Industrial)	9.3	0.875 FAR	355,000 s.f.
Total Business Buildout	**29.4**		**749,000 s.f.**

[4] Includes the approved subdivision along Coles Island Road.
[5] This figure excludes wetlands that are within the protected open space as well as beach and dune areas that are already developed.
[6] The first 100' of Riverfront Area are essentially a no-build area. This figure only includes land that is not included within any of the other categories.
[7] MAPC developed the intensity formulas based on an analysis of Gloucester's Zoning Ordinance as well as a knowledge of typical development practices. For example, in the R-RA zoning district, the base zoning density of one dwelling unit per 40,000 square feet (1.089 d.u. per acre) is reduced by 18% to account for new roads, irregular lot shapes, wastage, etc.
[8] Floor-Area Ratio (FAR) equals the number of building square feet divided by the total lot area. For example, a 10,000 square foot lot containing a 4,500 square foot building would have an FAR of 0.45.

4. Estimate the potential impact of the buildout on population, public services and environmental resources by using pre-determined formulas developed by MAPC.

Table 10-3: Potential Impacts of Residential Buildout

Impact Area	Formula	Potential Impact
New Residents	2.4 residents/d.u.	4,125 residents
New Schoolchildren	0.33 children/d.u.	567 schoolchildren
Additional Water Usage	180 gallons per day/d.u.	309,000 gallons per day

Based on the MAPC buildout methodology (which does not consider soil constraints), the Study Area could accommodate a significant amount of new growth. The Study Area currently contains about 1,100 dwelling units, but could add an additional 1,700 dwelling units (a 150% increase, for a total of 2,800 units) under full buildout.

10.3 Buildout Under Alternative Wastewater Management Scenarios

Given the importance of soil constraints in the Study Area, the above buildout analysis based on the MAPC methodology was refined in order to evaluate the growth potential under alternative wastewater treatment scenarios. In addition, the buildout analysis was conducted for ten individual sub-areas of the Study Area in order to examine the potential impact of providing sewer service to various portions of the Study Area. The following four scenarios were examined:

- **Scenario 1:** Under this scenario, sewer service would be available throughout the entire Study Area. This scenario could happen if the City did not revise its existing Private Sewer Rules and Regulations and private sewer extensions were built to service new development. In this scenario, soils are not considered to be a development constraint because there is no need to site a septic system. Accordingly, the buildout projections under Scenario 1 are the same as under the MAPC buildout methodology.

- **Scenario 2:** Under this scenario, sewer service would be provided in the Sewer Service Areas (SSAs) and Contingent Sewer Service Areas (CSSAs) (both the City areas and the Private areas). This assumes that the City had revised its Private Sewer Rules and Regulations to prohibit sewer extensions outside of the designated SSAs and CSSAs areas shown in Figure 5. Under Scenario 2, it is also assumed that buildable land in the unsewered areas would be built out at 25% of the maximum density allowed under zoning, using on-site septic systems.[9]

[9] The 25% figure is an estimate, and was derived by examining historical development and land use patterns since the adoption of the original and the revised Title 5 regulations.

- **Scenario 3:** Under this scenario, sewer service would be provided only in the City SSAs and City CSSAs. This scenario would occur if no private sewer extensions were built within the Private SSAs or Private CSSAs and if the City had revised its Private Sewer Rules and Regulations to prohibit sewer extensions outside of the SSAs and CSSAs shown in Figure 5. Under Scenario 3, it is also assumed that buildable land in the unsewered areas would be built out at 25% of the maximum density allowed under zoning, using on-site septic systems.

- **Scenario 4:** Under this scenario, no sewer service would be provided in the Study Area. All buildable land would be built out at 25% of the maximum density allowed under zoning using on-site septic systems. This scenario is not likely for the whole Study Area given that agreements are already in place to build a sewer line in Essex Avenue. However, this scenario provides a baseline comparison as well as a realistic option for certain sub-areas within the Study Area.

A summary of the buildout analysis under alternative wastewater management scenarios is provided in Table 10-4. The sub-areas shown in the left column were delineated so as to help the City evaluate the potential growth impacts of retaining versus revising the Private Sewer Rules and Regulations. For example, the Sumner/Overlook Sub-Area includes not just the land proposed for sewering but also nearby land that might be subject to private sewer extensions if the Private Sewer Rules and Regulations were not revised. The spreadsheet calculations of this analysis are provided as Appendix B.

Table 10-4: Buildout Under Alternative Wastewater Scenarios

Sub-Area (See Figure 9)	Developable Acres[10]	# of Dwelling Units Under Scenario #1	#2	#3	#4
Essex Ave.	162	418	385	355	105
Walker St.	83	75	26	26	19
Sumner/Overlook Area	192	172	66	66	43
Top of Concord St.	263	168	42	42	42
Fernald and Bray Sts.	201	180	45	45	45
S. End of Concord St.	36	63	42	28	16
Middle of Concord St.	157	237	112	81	59
Atlantic St.	171	249	76	76	62
Rust Island	33	108	52	27	27
The Beach	27	47	12	12	12
Total	**1,325**	**1,717**	**858**	**758**	**430**
Net Impact[11]		**1,287**	**428**	**328**	**0**

Scenario 1: Sewer the entire area
Scenario 2: Sewer the SSAs and Contingent SSAs (both City and Private)
Scenario 3: Sewer the City SSAs and Contingent City SSAs only
Scenario 4: No sewer

As shown in Table 10-4, the sewer service recommendations for the Study Area could result in considerably more growth than if no sewer service were provided (approximately 860 new dwelling units versus 430). However, these impacts are far less that the projected impacts under Scenario 1, which would occur if the City did not revise its Private Sewer Rules and Regulations.

As shown in the area-by-area breakdown, the growth impact of allowing private sewer extensions in the Private SSAs and Private CSSAs are relatively modest (for example, an additional 25 dwelling units on Rust Island and 26 units in the Kent/Eveleth area). However, the impact of extending sewer to more distant areas such as Wingaersheek Beach or the Coles Island area would be much larger. For example, private sewer extensions would allow an additional 187 units to be built along the northern end of Atlantic Street and an additional 126 units in the top of Concord Street area.

[10] Residentially zoned land only.
[11] Net growth impact of each scenario as compared to Scenario 4 (no sewer).

11. Public Input and Land Use Goals

In order to establish a framework for developing land use policies and recommendations for the Study Area, Daylor solicited feedback from the public on issues related to land use, open space, housing, business development, community character, and related topics. In addition to the input provided through this planning process, Daylor carefully considered the vision and goals reflected in other previous and ongoing planning efforts in Gloucester.

11.1 Previous and Ongoing Plans

Two other Gloucester planning studies were identified as being particularly relevant to this study. These are discussed below.

11.1.1 Plan 2000

Plan 2000 is an ongoing effort to develop a policy guide for City decision-makers to use over the next ten years or so. The Gloucester Community Development Department and a wide range of local stakeholders have been working on the project since 1999, and final completion is expected sometime in mid-2001. The Cecil Group has been assisting the City with Plan 2000. As part of their work, more than a dozen public meetings have been held, including neighborhood meetings and topic-specific meetings (e.g., housing, growth management).

As discussed in Section 1.1, Plan 2000 focuses more on vision and goals and less on implementation actions than the West Gloucester Land Use and Wastewater Plan. For this reason, Plan 2000 overall, and especially the feedback from the West Gloucester neighborhood meeting, were useful in developing a planning framework for this study. To ensure that the two plans were consistent and complemented one another, Daylor communicated with staff from the Cecil Group during the planning process. The following is a summary of some of the key Plan 2000 goals that are relevant to this study:

- Manage growth by distributing new development in a way that reinforces the City's existing pattern of dense developed areas and open space.
- Match development patterns to infrastructure investments that have already been made or which are cost effective to provide.
- Protect the integrity of residential neighborhoods and guide new development into patterns that are consistent with this context.
- Protect public viewsheds, byways, and special places that are unique to Gloucester.

- Preserve highly valued open space including both small and large open tracts.
- Protect Gloucester's environmental resources to preserve the water supply and water quality and to conserve rare and sensitive natural environments.
- Provide quality affordable housing for low and middle income Gloucester residents.

11.1.2 Open Space Plan

Gloucester's 1998-2003 Open Space Plan contains an inventory of natural resources and open space lands, goals and objectives related to open space and recreation, and a five-year action plan to implement some of the Plan's recommended policies. Some of the objectives and action items contained in the Plan that are relevant to this study include:

- Identify areas that are environmentally sensitive and areas that are suitable for development.
- Establish a strong growth management policy that includes a revised zoning ordinance, revised subdivision regulations, a revised wetland ordinance, and a land protection policy.
- Protect water resources by identifying failed septic systems, adopting stormwater regulations, and monitoring pollution in water bodies.
- Preserve sensitive resource areas including wetlands, beaches, woodlands, and habitat.

According to the City Planner, the City intends to begin a more thorough open space planning process in the near future in order to develop criteria for ranking potential open space acquisitions. This process may include the establishment of a committee and a process for acquiring and protecting open space lands.

11.2 Public Input During the Planning Process

The Ward 5-2 public was invited to comment on issues related to land use at the November 1 and November 15 public meetings as well as by submitting written comments at any time. Based on this input, there was general consensus on the following points:

- The area should retain its existing rural character as much as possible.
- The City should play an active role in protecting open space within the Study Area.
- The City should protect sensitive natural resources including the creeks, wetlands, wildlife habitat, and shellfish beds.

- The design of new development should be sensitive to and compatible with the existing neighborhood context including scenic roads and viewsheds.
- New development should be clustered in order to protect open space—provided that the open space is permanently protected.
- The City should adopt policies that facilitate the creation of affordable housing for Gloucester's diverse economic groups.
- The City should adopt new regulations sparingly. The City should try to do as much as possible by enforcing existing regulations and pursuing non-regulatory approaches.

There was at least some disagreement on the following points:

- Many of the participants favored the creation of a "village" area somewhere in the Study Area consisting of higher density housing and small retail uses. However, there was no consensus on where a village should be located, and some participants opposed the creation of a village altogether.
- Most residents opposed increasing the minimum residential lot size ("downzoning"), but a few favored downzoning as an additional way of controlling growth.
- While some participants would like to have small shops and services within the Study Area, others did not want any new business at all.
- Several residents pointed out that the property rights of existing landowners in the Study Area should be respected: the City should buy their land if they did not want to see it developed.

At the November 15 public meeting, participants were also asked to identify undeveloped parcels in the Study Area that they felt should remain as open space. More than 20 parcels/areas, located throughout the Study Area, were suggested. The full list of is included in Appendix A.

11.3 Goals and Objectives

Based on the information presented above, Daylor developed the following set of general land use goals and objectives for the Study Area to guide the land use recommendations.

- Direct any new growth away from rural areas and environmentally sensitive areas.
- Protect additional high priority open space lands through a variety of mechanisms.
- Maintain the Study Area's existing character by promoting compatible development designs.

- Protect the area's natural resources by enforcing existing regulations and promoting environmentally sensitive design.
- Encourage and facilitate the maintenance of existing affordable housing and the construction of new affordable housing through a variety of mechanisms.
- Develop effective implementation tools that do not unduly burden existing landowners.

12. Land Use Plan

Based on the goals and objectives stated above, this section outlines appropriate land use policies to direct growth into a pattern most compatible with the desires of the City and its residents. These policies complement the wastewater recommendations presented in Section 7; in fact, the proposed extension of the sewer into the recommended areas provides some unique opportunities in terms of land use planning. Land use recommendations are also shown on Figure 10.

12.1 Managing Growth

Based on the goals and objectives, Daylor sought to develop policies that would steer growth away from rural and environmentally sensitive areas while allowing a range of appropriate development (e.g., single-family housing, senior housing, affordable housing, and possibly some small business uses) in appropriate areas. In general, the areas being recommended for sewer service are more suitable to accommodate new development than the areas not recommended for sewer. In addition, it is more economical for both the City and the landowner to locate new development in areas where sewer service will already exist, rather than extending the sewer to new areas or servicing new development using on-site septic systems.

12.1.1 Residential Growth Management Options

A range of tools was considered in order to direct residential growth into the desired patterns. Two of the most potentially effective tools for achieving compact and environmentally sensitive development are cluster zoning and transfer of development rights.

Cluster Zoning

Cluster zoning, and a similar concept called "open space residential design," are techniques for siting development in a more environmentally and aesthetically sensitive manner. (See Section 9.3 for a discussion of Gloucester's existing cluster zoning ordinance.) Cluster zoning can work well to create compact development and open space within a single parcel of land. Within the Study Area, therefore, cluster zoning could help to create better-designed development within the rural sections of the Study Area, but would not help to direct development away from the rural areas entirely.

Clustering works best on large parcels of land (so that a significant acreage of open space can be set aside) and when at least a portion of the parcel is relatively unconstrained (so that development can be clustered in an area where moderate- to high-density housing is compatible with environmental characteristics and so that individual or community septic systems can be sited). Within the Study Area, there are only a few large parcels of land (e.g. >30 acres), and virtually all of the land is at

least partially constrained by soil conditions. Given the requirements of Title 5, it could be difficult to build cluster developments in the Study Area using on-site or community septic systems for wastewater treatment.

Nevertheless, cluster zoning is a potentially powerful tool and should be carefully considered for the Study Area. In recent years, the City has indicated some interest in revamping its cluster zoning ordinance. The City participated in a collaborative project entitled "Green Neighborhoods" to develop a strategy whereby open space residential design could be used in North Shore cities and towns to the benefit of communities, developers, and the environment. In addition, open space residential design has been a focus of the Planning Board and the authors of Plan 2000. If and when the City revises its cluster zoning ordinance, cluster zoning should continue to be an option within the Study Area. Developers will make the final determination as to its feasibility on any given site.

Transfer of Development Rights

In some places, primarily outside of Massachusetts, Transfer of Development Rights (TDR) has been used to preserve large amounts of open space in rural areas by re-directing growth into designated development areas (often in or near existing settled areas). The way this works is that the owner of the rural land sells the development rights on his/her property to an owner or developer within one of the designated development areas. The rural land is then protected by a permanent conservation easement, while the owner in the designated development area can use the acquired development rights to build at a higher density than would ordinarily be allowed. Development right transactions can occur entirely on the private market, or a public agency can act as the "broker" for development rights.

Compared to cluster zoning, TDR has the significant advantage of redirecting development from one section of a city (or county) to another section, not just shifting the layout of development within a single parcel of land. For this reason, TDR would theoretically be a very appropriate tool for the Study Area. However, TDR is complicated to administer, not widely understood by citizens and decision makers, and has a very limited record of success in Massachusetts.

12.1.2 Incentive Zoning

Recognizing the problems with both cluster zoning and TDR for the specific circumstances of the Study Area, Daylor developed a tool intended to combine the area-wide focus of TDR with the relative simplicity of cluster zoning. This tool, known as "incentive zoning," can be used to target new growth to appropriate sewered areas while permanently protecting open space in high-priority areas that are not proposed for sewer service. More broadly, incentive zoning can be used to encourage developers to build in a way that meets identified public and City goals.

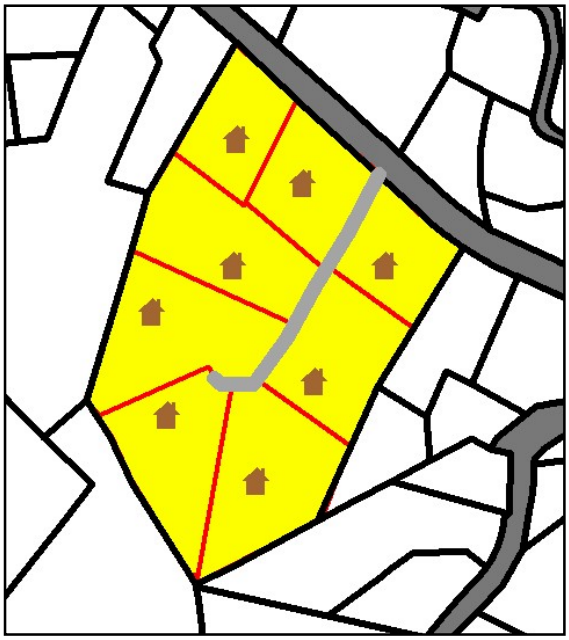
Under an incentive zoning policy, developers are offered a density bonus in exchange for providing certain public benefits or amenities such as open space or affordable housing. Developers are not required to avail themselves of the density bonus; they are still free to build a "conventional" project without the public benefits.[1] However, an effective policy provides incentives that are sufficiently attractive that developers will want to use them.

Incentive zoning could be structured in several different ways, depending on the objectives that the City wished to accomplish. In the Study Area, incentive zoning could be used to promote open space protection and affordable housing. Incentive zoning should apply within the less environmentally sensitive sections of the Sewer Service Areas, as shown in Figure 10. The following diagrams illustrate how incentive zoning could be implemented in the Study Area. The particular numbers presented in this example are shown for illustration purposes only, and may need to be modified during the implementation process.

[1] By establishing the incentive provisions as an "optional" development method, incentive zoning eliminates the concern that such a law could be found to be an unlawful taking or exaction.

Incentive Zoning Overview: These five diagrams illustrate several different development options for a hypothetical 2-acre parcel in the R-3 zoning district, assuming that the City had adopted an incentive zoning ordinance that provided density bonuses for contributing to open space and/or affordable housing.

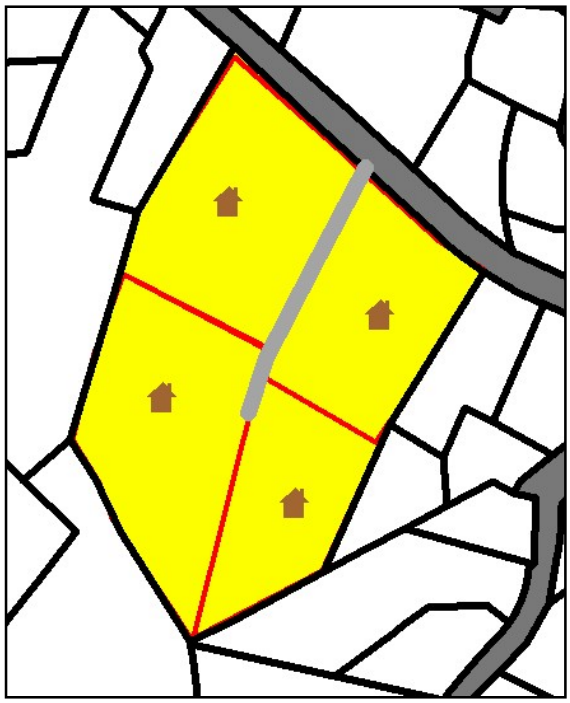
Scenario 1 (current zoning): Current zoning in the R-3 district requires a minimum lot size of 10,000 square feet per dwelling unit. Therefore, as shown in this diagram, up to eight houses would be allowed on a 2-acre parcel. Under current zoning, the developer has no incentive or obligation to provide open space or affordable housing.



Key to the Diagrams

- Unit allowed as a matter of right
- B — Bonus unit allowed in exchange for open space contribution
- A — Affordable unit constructed under the incentive provisions
- M — Bonus market rate unit allowed in exchange for providing affordable unit
- Bonus 2-bedroom unit allowed in exchange for providing affordable unit

Scenario 2 (no density bonuses taken): In this example, the minimum lot size is increased from 10,000 square feet to 20,000 square feet. Consequently, only four houses could be built as matter of right, if the developer did not take advantage of the incentive provisions. Reducing the as-of-right density reduces the potential environmental, fiscal, and service impacts of new development while also encouraging developers to take advantage of the incentive provisions.



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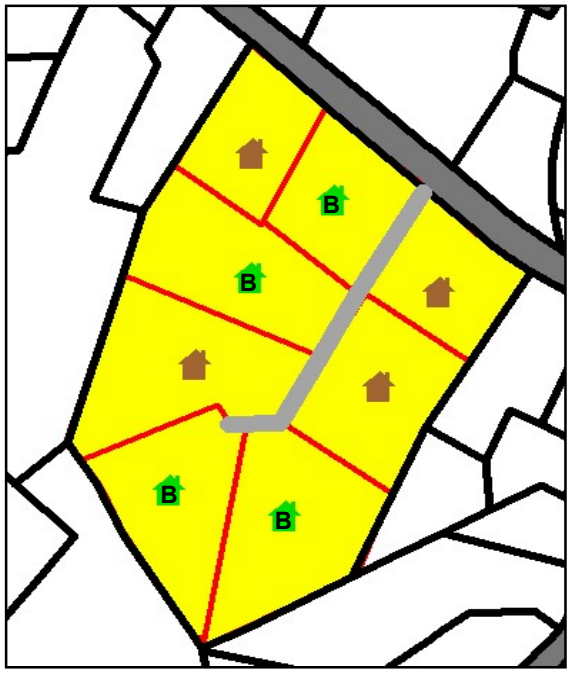
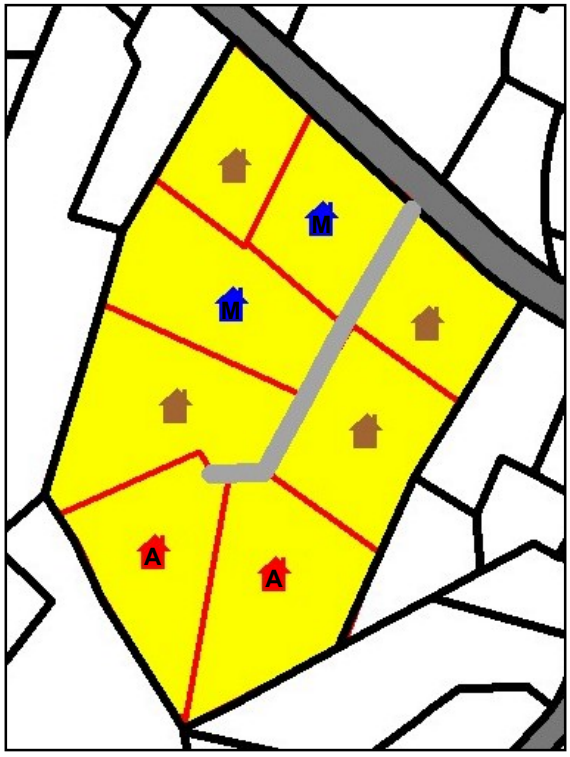


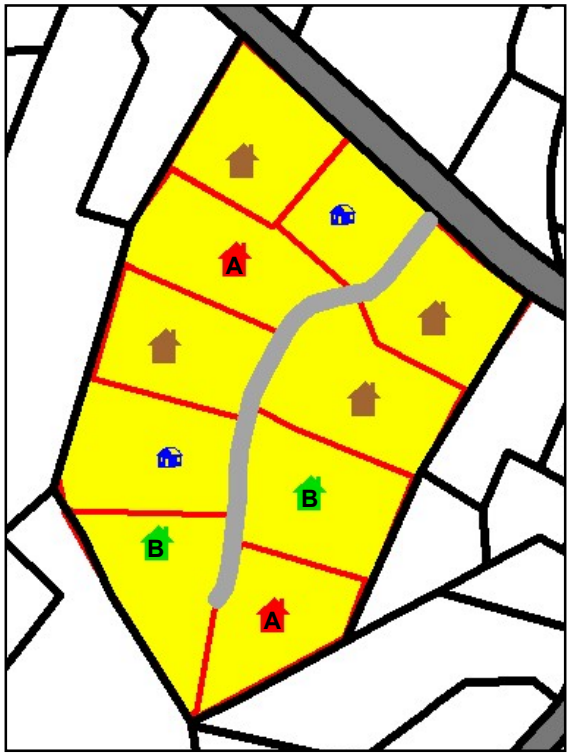
Scenario 3 (density bonus for open space): The developer receives a density bonus of 100% (an increase from 4 units to 8 units) in exchange for contributing to an open space fund that is used to purchase or protect vacant land elsewhere in the Study Area. The amount of the contribution to the fund is based on the number of additional units that the developer is allowed to build. For example, the required contribution might be set at $15,000 per unit. In this example, public benefits of the development include **$60,000 toward the purchase of open space.**



Scenario 4 (density bonus for affordable housing): The developer receives a density bonus of 100% (an increase from 4 units to 8 units) in exchange for providing two affordable housing units. In this example, the developer is allowed to build one additional market-rate unit for each affordable unit that is built, up to a 100% density bonus. Alternatively, the developer could contribute money toward a City-administered affordable housing fund. In this example, public benefits of the development include **2 affordable housing units.**

Key to the Diagrams

- Unit allowed as a matter of right
- B — Bonus unit allowed in exchange for open space contribution
- A — Affordable unit constructed under the incentive provisions
- M — Bonus market rate unit allowed in exchange for providing affordable unit
- Bonus 2-bedroom unit allowed in exchange for providing affordable unit



Scenario 5 (density bonus for open space and affordable housing): The developer receives a density bonus of 50% for contributing to open space protection and an additional bonus of 100% for providing affordable housing, for a total bonus of 150% (the maximum bonus allowed -- an increase from 4 units to 10 units). In order to minimize growth impacts, any units above what would be allowed under current zoning (i.e., units #9 and 10) are restricted to 2 bedrooms per unit. 2-bedroom units are suitable for empty nesters, senior citizens, and starter homes. In this example, the public benefits of the development include **$30,000 toward the purchase of open space, 2 affordable housing units, and 2 deed-restricted 2-bedroom housing units.**

12.1.3 Business Areas

The Study Area contains a few areas that are zoned for business uses. These are located primarily at the three highway interchanges and along the southern side of Causeway Street. Based on the public input provided during the planning process, the zoning for these areas may be inconsistent with the community's vision for these sites. While most residents wanted to see business uses in the Study Area limited to small scale, neighborhood-serving retail and service businesses, the General Industrial and Extensive Business districts allow a wide range of business uses, some of which are large in scale and could have significant impacts. For example, car dealerships and warehousing are allowed in both the EB and GI districts, and manufacturing is allowed in the GI district. Most of the areas zoned EB and GI are quite visible from Route 128 and therefore serve as a gateway to Gloucester for drivers arriving from the southwest.

The City should consider re-zoning the areas that are now zoned EB or GI. Existing uses, such as the car dealerships and industrial property on Causeway Street, would be allowed to remain, but if the sites are ever redeveloped, a framework would be in place to attract development that was more aesthetically and environmentally sensitive and perhaps generated more tax revenue as well. The Neighborhood Business zoning category would be appropriate for attracting small scale uses, although it may be excessively restrictive. One possibility is to zone these areas NB but allow higher intensity development on a case by case basis through a community based planning process as discussed in the next paragraph.

12.1.4 Planning for Large Sites

The Study Area contains a few large, prominent undeveloped sites that may become very attractive for development if they are served by sewer in the future. New development on these sites could benefit the neighborhood by providing affordable housing, small businesses, or a local gathering place—or it could result in significant negative impacts. Four such large vacant sites are indicated with stars in Figure 10.

The importance of these particular sites for the future of the Study Area warrants a more detailed planning process that exceeds the scope of this study. For each of these sites, the City should sponsor, or work with the landowner/developer to sponsor, a public planning process to develop a vision, goals, and development program for the future of the site. The planning process could be facilitated by the City or by a planning consultant, perhaps with input from a real estate/market specialist. The goal of such a process would be to arrive at a development program that benefited the landowner/developer, the City, and the area residents more than a conventional development plan. As an example, the community may decide that the development

of a particular site should provide senior housing, some small businesses, and a neighborhood pocket park and playground. Design guidelines could also be established that were specific to the site being planned. Once such a development program had been identified, the City Council would modify the zoning for the site to allow this program to be built.

12.2 Preserving Open Space

Throughout the planning process, residents identified the preservation of open space as a top priority for the Study Area. Open space can be permanently protected in several different ways including outright purchase by the City or a private party; purchase of an easement or conservation restriction; designation of open space as part of a new development (e.g., through cluster zoning or incentive zoning); or donation of land or conservation restrictions by individual landowners.

Money for open space protection could be provided by City allocations for open space protection or by funds raised through the Community Preservation Act, if the City chooses to adopt this Act.[2] Realistically, however, City funds for open space protection in the Study Area might be unavailable or very limited. As discussed above, incentive zoning can play a significant role in protecting open space in the Study Area by providing funds for the purchase of open space in the rural sections of the Study Area. These funds should be administered by the City and specifically earmarked for open space protection in the Study Area. In addition, this City-administered fund could act as a small land trust serving the Study Area alone. Given the great public sentiment within the Study Area for protecting open space, residents might be willing to contribute to the land trust if they knew their money was going to be spent to protect open space in their neighborhood. Numerous Massachusetts communities have already been successful in establishing local land trusts.

Developing an open space protection strategy is essential for maximizing the utility of limited funds. The City should establish an open space committee for setting citywide priorities and perhaps a subcommittee for recommending how the open space fund for the Study Area will be spent.[3] For example, based on input at the public meetings, residents value undeveloped lands that are located along or near creeks, rivers and wetlands; lands that provide scenic views out to the marshes or the ocean; and prominent tracts of woodland along major roads

[2] The Community Preservation Act, a state law which passed during the summer of 2000 (Chapter 267 of the Acts of 2000), provides Massachusetts communities with the option of creating a property tax surcharge of up to 3% to help fund preservation activities. The regulation stipulates that at least 10% of the money must be used for each of three purposes: open space protection, historic preservation, and affordable housing. The remaining 70% of the money can be used for any combination of these three purposes. For cities and towns that adopt the Community Preservation Act, matching state funds will also be distributed.

[3] This process could be conducted as part of preparing a new Open Space and Recreation Plan for the City. The open space planning process should begin by early 2002 since the City's current Open Space and Recreation Plan must be updated by 2003.

that help to define the rural character of the Study Area. If these criteria were applied, some of the lands shown with green dots in Figure 10 would be identified as high-priority open space acquisitions.[4]

A final option for increasing the amount of protected open space in the Study Area is for the City to acquire tax title properties (i.e., properties that are subject to seizure because of an ongoing failure to pay property taxes). If the City does pursue this method, however, it should carefully consider the location, environmental sensitivity, and development potential of the land. In some cases, tax title lands might make appropriate sites for the construction of affordable housing and could be turned over to the Gloucester Housing Authority or a nonprofit affordable housing organization.

12.3 Providing an Appropriate Mix of Housing

As discussed in Section 8.4, providing enough affordable housing is, and will continue to be, a major challenge in Gloucester. In addition to affordable housing, there is a need for housing for other sectors of the market such as senior citizens and one- and two-person households of all ages.

The incentive zoning proposal discussed in Section 12.1 illustrates how incentives could be used to encourage the creation of affordable housing in the Study Area. Typically, to make such incentives attractive for developers, developers must be allowed to build one or more bonus market-rate units for each affordable unit that is built. However, some developers prefer not to build affordable housing themselves because of the financial risks involved. For this reason, the incentive zoning policy should offer several options for how developers can contribute to affordable housing. For example, developers could be allowed to:

- **Build Affordable Housing On-Site:** Developer could build the required affordable housing themselves. The affordable housing would be integrated into the development.
- **Build Affordable Housing Off-Site:** The developer could build the affordable housing in another location in the City. For example, it may be more economical to build the affordable housing downtown, where it is easier to gain approval to build multi-family units.
- **Contribute to an Affordable Housing Fund:** For each bonus unit that the developer is allowed, he or she could contribute a set amount of money to an affordable housing fund that the Gloucester Housing Authority would then use to build or rehabilitate affordable housing. This option will appeal to many developers who do not want to

[4] The green dots on Figure 10 shown as "Priority Areas for Open Space Protection" are meant to depict general areas of land such as land along Walker Creek and land adjacent to the Thompson Mountain conservation land. The dots are not meant to depict specific parcels of land.

take on the financial risks of building the affordable housing themselves. In addition, this option allows developers of small projects (e.g., subdivisions of less than 10 lots) to take advantage of the affordable housing bonus provisions.

- **Provide Land for the Construction of Affordable Housing:** In some cases, a developer will subdivide and permit a tract of land and sell the individual house lots to buyers who will build the houses themselves. In this circumstance, the developer should be allowed to take a density bonus for providing house lots that are designated for affordable housing. These lots could be deeded to the Gloucester Housing Authority or to a nonprofit affordable housing organization.

When developers choose to take a density bonus for affordable housing (or for open space), development standards should be relaxed in order to minimize unnecessary site development costs. The Subdivision Rules and Regulations already allow for quite a bit of flexibility, but could be modified to identify specific provisions for projects using incentive zoning. For example, the minimum roadway width could be narrowed, dead end cul-de-sac requirements could be reduced, and curbs and sidewalks could be made optional in certain situation. These development practices would be consistent with a higher-density residential development pattern and similar in character to many of the existing residential developments in the Study Area.

In addition to incentive zoning, several other policies are suggested to facilitate the construction of affordable housing in the Study Area. The City should consider pursuing several of these policies together in order to maximize the amount of affordable housing that is built:

- **Existing "Inclusionary Housing" Requirement:** The City currently has an inclusionary housing provision that requires that 10% of all units in large multi-family housing developments (more than 10 dwelling units or 20 bedrooms) be affordable to a family of three earning no more than 80% of the median income for the area. To the extent that multi-family housing developments of this size could be built in the Study Area, this provision would apply here.
- **Affordable Housing on Public Land:** The City owns several parcels of land in the Study Area that have not yet been designated for any specific use, but may be appropriate for affordable housing. These parcels are shown on Figure 10. The City should examine these parcels and determine whether they are appropriate for affordable housing development. If so, the City could transfer them to the Housing Authority or a nonprofit organization for this purpose. Alternatively, the City could issue a request for proposals to the private development community to build affordable housing on the site. By taking this type of a proactive approach, the City would have considerable control over the design, layout, and affordability provisions of the development (much more so than with a Comprehensive Permit application).

The City could also investigate the construction of affordable housing for city staff on surplus land on the West Parish School property. While unconventional, this option could provide needed housing, earmarked for Gloucester employees, with minimal impact on the neighborhood.

- **Addressing "Teardowns" and Additions:** As sewer service is provided to existing neighborhoods with small homes (such as Becker Lane and Valley Road), wastewater limitations that previously prevented expansion of existing houses will be removed. As a result, it is likely that many landowners will want to add additions to their houses or even tear down the existing house and build a new one. This process is known as "mansionization." Over time, this process could replace affordable houses with more expensive ones and reduce affordability in the neighborhood.

  As many Massachusetts communities have already begun to experience, teardowns and additions are difficult to control, and no tools have yet been developed that address this issue in a fully satisfactory way. One option is to establish a maximum floor-area ratio for residentially-zoned land which would restrict the size of a house that could be situated on a lot according to the size of the lot.[5] However, such a regulation would limit the extent to which existing Gloucester homeowners could upgrade their property—and there was not a clear mandate from the public to impose this type of restriction in the interest of maintaining affordable housing. In addition, from a legal perspective it is possible that limiting the use of an individual's property for the sake of maintaining housing affordability would be construed to be a taking.

  Another option for slowing mansionization would be to provide tax incentives for homeowners who retain their property as small, affordable units. This option would cost the City money but it may be less expensive than other means of creating or retaining affordable housing. If the City wishes to investigate this tax incentive option, it should first commission a study to determine the relative fiscal impact of houses of various sizes and values.

- **Smaller Units:** As illustrated in the incentive zoning diagrams in Section 12.1, incentive zoning could be used to encourage the creation of smaller 1- and 2-bedroom units. Newly constructed 1- and 2-bedroom units could have a deed restriction that prevented the addition of bedrooms at some later time. Such housing would be suitable for empty nesters and senior citizens as well as for starter homes. Many communities have found that smaller units tend to generate fewer public schoolchildren, although this may not be the case in Gloucester. In addition, this advantage could be more than offset by the lower assessed value that smaller units

[5] Floor-Area Ratio (FAR) equals the number of building square feet divided by the total lot area. For example, an FAR limit of 0.2 would allow a maximum house size of 2,000 square feet on a 10,000 square foot lot.

tend to have. Again, a fiscal impact study could shed some light on the relative costs and benefits of smaller housing units.

- **Housing Communities and Housing in Mixed Use Developments:** As discussed above, at least four large, prominent sites in the Study Area deserve special planning consideration. Housing could be integrated into these sites in creative ways. One possibility is to create a small village center with stores and perhaps a small park. Housing could be located in second and third story apartments above the shops or in stand-alone townhouse-style buildings. Another option, suggested by a resident at one of the public meetings, would be to build a senior housing community, which might or might not include an assisted living component. It should be noted, however, that the Study Area is more remote than other neighborhoods from senior citizen services such as shopping, social services, and medical care facilities. Again, the community, the landowner, and the City should jointly plan for the future of these important sites.

12.4 Managing the Character and Quality of Development

At the public meetings, residents expressed two potentially contradictory viewpoints concerning the character and quality of new development in the Study Area. On the one hand, new development should be carefully designed to be compatible with the existing character of the area. On the other hand, residents expressed concern about the potential burden of additional City regulations. Accordingly, the City should carefully weigh the potential benefits of additional regulations or development guidelines against the potential landowner burden and administrative cost. The following provisions may be appropriate.

12.4.1 Environmentally Sensitive Design

Much of the remaining buildable land in the Study Area is characterized by challenging site conditions such as steep slopes, high groundwater, and shallow soils. In addition, many of these sites are located in close proximity to sensitive water resources. If proper care is not taken, the development of these sites could result in significant runoff, erosion, and nonpoint source pollution, which would threaten to undermine whatever gains in water quality are provided by the sewer. The City should consider the following actions to address these issues.

Stormwater Management

The Study Area contains unique constraints to siting stormwater management systems because of the prevalence of ledge and high groundwater. Such features limit the potential to recharge stormwater to the ground or to treat stormwater using natural vegetated systems. Given these conditions, special care is needed in siting, designing, and maintaining stormwater systems so that they do not damage the environment by increasing pollutant loads, exacerbating flooding and erosion problems, or altering natural systems.

Most projects within the Study Area would already be subject to the City's Subdivisions Stormwater Management Regulations and Drainage and Grading Requirements, as well as the DEP Stormwater Management Policy if they fall under the Wetlands Protection Act. (See Section 4.3.4 for a discussion of these regulations.) The City's stormwater management regulations are already fairly progressive, and provide some important additions to the DEP Policy by addressing saltwater intrusion, nutrient loading, and habitat alteration as well as stating a preference for natural vegetated systems and infiltration systems for managing stormwater. Nevertheless, there may be some room for improving these regulations. In particular, the City should carefully compare its own regulations to the DEP's Stormwater Management Standards and identify any gaps. Currently, some of the important Stormwater Management Standards are not addressed in the City regulations, such as the requirement to remove 80% of total suspended solids from stormwater. The City may simply want to reference the DEP's Stormwater Management Standards in their local regulations to ensure compliance with this set of guidelines.

Perhaps more important than these regulatory changes is the City's attention to "nonstructural" stormwater management practices such as public education, enforcement, and environmentally sound municipal activities. In an environmentally sensitive location such as the Study Area, the actions of individual landowners become very important, and therefore public education should be a high priority. Other practices such as regulatory enforcement and altering municipal activities may require additional City staff. However, all of these nonstructural practices will eventually be required under the EPA's Phase II stormwater management program, and the City would be wise to begin implementing them as soon as possible.

Hillsides and Steep Slopes

Steep slopes characterize much of the vacant land in the Study Area. As land prices increase, these sites will become increasingly attractive for development despite the additional development costs. The development of steep slopes can result in negative environmental impacts both during and after the construction of a new project—particularly erosion and runoff. In addition, the development of hillsides, if not sensitively planned, may create significant visual impacts by replacing scenic ridgelines with buildings.

One way of addressing these potential problems is to establish a hillside overlay district and a corresponding ordinance that governs activities within this district. The district could apply to all areas of steep slopes (e.g. 10% or greater). Effective hillside bylaws commonly provide for additional design standards and an additional level of review for activities proposed within the overlay district such as new construction,

significant additions to existing structures, and earth moving activities. These provisions might include:

- Requirements to retain natural vegetation[6]
- Standards for slope stabilization and erosion control
- Site planning guidelines that require new buildings to be sited within the treeline and below the crest of a ridge in order to minimize visual impacts
- Building design guidelines that require prominent or highly visible structures to blend into the natural landscape through the use of appropriate building materials, colors, and massing

As an alternative to adopting a hillside overlay district as part of the zoning ordinance, many of the same protections could be achieved through a modification of the Subdivision Rules and Regulations, which can be amended by an action of the Planning Board. It should be noted that curtailing the removal of natural vegetation on steep slopes could work at cross purposes with the incentive zoning provisions, which attempt to create compact, affordable development by allowing higher-density development and creative site planning. In addition, the hillside protections are most important in areas near sensitive coastal water resources and in areas where wastewater will be treated on-site (septic system installation usually requires much more significant site alternation than connecting to a sewer). For this reason, it may be appropriate to exclude the incentive zoning area from the hillside overlay district.

12.4.2 Scenic Roads

Chapter 40, Section 15C of the Massachusetts General Laws authorizes municipalities to designate any road within the community, other than a numbered route or a state highway, as a "scenic road." After a road has been designated as a scenic road, any repair, maintenance, reconstruction or paving work cannot result in the cutting or removal of trees or destroying of stone walls without prior written consent from the Planning Board and a public hearing. Many of the roads within the Study Area appear to be good candidates for scenic road designation, such as Concord Street, Atlantic Street, and Bray Street.

As the City moves ahead with sewer construction in the Study Area, a scenic road designation on some or all of the affected roads would provide an additional level of review by the public and the Planning Board as to how the sewers are installed. This

[6] Some communities require a certain percentage of the natural vegetation to be retained on a site depending on the steepness of the site. For example, 30% of the natural vegetation must be retained if the slope exceeds 10%, 50% if the slope exceeds 15%, 70% if the slope exceeds 20%, and 85% if the slope exceeds 25%. Clearcutting would be prohibited anywhere in the hillside overlay district.

would help to address residents' concern that sewer construction could permanently alter the character of the neighborhood by widening roads and removing trees.

The scenic roads designation applies only to work within the road right-of-way, and does not affect the use of land abutting the roadway. In order to protect the scenic quality of land outside the right-of-way, the City would need to adopt a corridor protection overlay district that extends a specified distance from the road. Such a district might be appropriate for Essex Avenue—a road with high visibility and considerable rural charm that serves as a gateway to Gloucester from the west. The most important provisions in an Essex Avenue corridor overlay district would be to limit the cutting of trees and require new development to be sited back from the road so as to maintain the wooded edge that gives the road its rural feel. It should be noted that while many Massachusetts communities have adopted scenic road designations pursuant to Chapter 40, Section 15C, very few have adopted corridor overlay districts to protect scenic quality.

12.4.3 Building Design

Some Massachusetts communities that are concerned about the quality and aesthetics of new development have adopted design review provisions for architectural review. The review can apply to all structures, or it can apply only within certain districts (e.g., historic districts or scenic corridor districts), or only to structures of a certain size or type. The review is typically administered by a design review board that makes recommendations to the Planning Board.

Based on input from the public, a design review policy is probably not warranted for the Study Area. One possible exception is on the large, prominent sites discussed in Section 12.1.4. On these sites, design guidelines should be part of the participatory planning process.

12.5 Transportation

The scope of this study does not include a quantitative transportation analysis. However, the following transportation-related policies are suggested based on public input and consistency with the land use recommendations:

- Existing road widths and road alignments within the Study Area, while perhaps inconsistent with modern day standards in some cases, appear to function well and to serve as a traffic calming device. There is little or no sentiment from Study Area residents to widen or straighten existing roads.
- Similarly, roads in new developments should be relatively narrow, tree-lined, and conform to the existing topography with minimal regrading. While the Subdivision Rules and Regulations already allow some flexibility in road design, these provisions

should be carefully reviewed and compared to existing roads in the Study Area to determine whether they need to be modified.

- There is not a clear need for new sidewalks throughout the Study Area. However, sidewalks in localized areas might be desirable if residents feel that they would be used. Essex Avenue and the section of Concord Street near the West Parish School are two areas that should be considered for sidewalks.
- Off-road paths and trails should be developed on protected open space and other public lands. These paths and trails would provide nearby recreational opportunities for local residents as well as provide public access to conservation land (a commonly cited concern in Gloucester). The City is currently working on a walking path that would connect the east and west sides of Route 128 by a bridge. Other possible path locations include a connection from Essex Avenue to Wingaersheek Beach via Thompson Mountain reservation and the disconnected portion of Bray Street; a coastal trail along Susan Point; a connection from Laurel Street to New Way Lane and the cemetery via the watershed lands; and public access to Mt. Ann Park. These routes would require cooperation from the Essex County Greenbelt Association, which owns some of the land.

13. Implementation

This Plan is intended to act as a policy guide for Gloucester's departments, boards, commissions, and City Council. However, it is up to these groups to implement the Plan by translating its recommendations into specific policies such as capital improvement projects, zoning ordinances, and other laws and regulations. This section provides a summary of next steps that the City must take in order to implement this plan. For each action item, one or more groups are identified as being responsible for implementing the particular item.

The action items are divided into short-term actions, medium-term actions, and long-term actions. The City should act on the short-term items within the next 12-18 months (i.e., by the middle to end of 2002) so that they are in place before the Essex Avenue sewer line becomes operational, which could occur during 2003. The medium-term actions should be completed within the next three years, or by the middle of 2004. The long-term action items are either considered to be a lower priority or are ongoing tasks that should be completed as time and money become available within the next two to five years (i.e., between 2003 and 2006). With the exception of some of the long-term action items, all of the implementation steps should be completed prior to the expiration of the West Gloucester Interim Planning Overlay District provisions in 2005.

Table 13-1: Short-Term Action Items (Within 12-18 Months)

#	Action Item	Discussed in Section	Responsible Group(s)
1	Modify the Private Sewer Regulations; Adopt the Sewer Service Area Map and supporting regulations	7.3	Engineering/Public Works, City Council, Legal
2	Based on this plan, inform homeowners that received upgrade notices whether to proceed with the upgrades.	---	Board of Health
3	Add sewer projects to the capital improvement plan; establish project phasing	---	City Council, Mayor, Planning Board, Capital Improvement Advisory Board, Engineering/Public Works,
4	Adopt incentive zoning ordinance	12.1.2	Community Development, Planning Board, City Council, Legal
5	Establish open space committee; update open space plan	12.3	Community Development, Planning Board, Conservation Commission
6	Hold discussions to consider placing the Community Preservation Act on the ballot	12.2	Community Development, Planning Board, City Council, Mayor
7	Adopt scenic road and/or Essex Avenue corridor guidelines, if appropriate	12.4.2	Planning Board, Community Development, City Council, Legal

Table 13-2: Medium-Term Action Items (Within 1-3 Years)

#	Action Item	Discussed in Section	Responsible Group(s)
1	Hire engineer; begin sewer system design	---	Engineering/Public Works, City Council, Mayor, Capital Improvement Advisory Board
2	Revise the cluster zoning ordinance (open space residential design)	12.1.1	Community Development, Planning Board, City Council, Legal
3	Examine City-owned land for its open space and affordable housing potential	12.2, 12.3	Community Development, Land Disposition Committee
4	Begin planning processes for large sites	12.1.4	Community Development, Planning Board, Ward 5 Councilor
5	Examine and revise Subdivision Rules and Regulations for consistency with development patterns in Study Area	12.3, 12.5	Planning Board
6	Develop a plan to comply with the Phase II stormwater rule, including regulatory changes if needed	12.4.1	Engineering/Public Works, Planning Board, Conservation Commission, Community Development
7	Establishing hillside overlay district, if appropriate	12.4.1	Planning Board, City Council, Legal, Conservation Commission, Community Development

Table 13-3: Long-Term Action Items (Within 2-5 Years)

#	Action Item	Discussed in Section	Responsible Group(s)
1	Hire contractor; begin sewer system construction	---	City Council, Engineering/Public Works, Capital Improvement Advisory Board
2	Continue planning processes and prepare zoning changes for large sites	12.1.4	Community Development, Planning Board, City Council, Legal
3	Act on tax title lands in Study Area	12.2	Community Development, Treasurer, Legal
4	Conduct fiscal study to determine the best strategy for addressing teardowns, affordable housing, and related issues	12.3	Community Development, City Council, Mayor

Appendix A

Summaries of Public Meetings

West Gloucester Land Use & Wastewater Plan
Input from Public Meeting #1 – 11/2/00

1. Overview

After presentations by the consultant team, participants were divided into seven breakout groups according to the neighborhood where they live. The breakout groups were asked to spend about 30 minutes discussing the following four questions:

1. **LAND USE, GROWTH & DEVELOPMENT**
   - What types of change would be positive in your neighborhood?
   - What types of change would you like to avoid?
     (Examples: housing, wider roads, businesses)

2. **ENVIRONMENT**
   - Are you concerned about wastewater-related pollution affecting your neighborhood?
   - If so, what resources are you most concerned about?

3. **PROPERTY**
   - How might your current wastewater treatment system affect the value of your property in the future?
   - How might a different wastewater treatment system affect the value of your property?

4. **OTHER**
   - What other factors do you think are important to consider in managing West Gloucester's wastewater treatment needs?

A recorder in each group summarized the main points that were raised in response to each question. During the last few minutes of the breakout groups, each participant was asked to fill out a ballot that required them to prioritize the importance several issues that might be affected by centralized and/or decentralized wastewater treatment systems.

2. Summary of Breakout Group Discussion & Written Comments

The following is a summary of each breakout group's response to each of the four questions. Also included are other comments that members of each breakout group wrote on their ballot.

GROUP #1 – Wingaersheek Beach Area (10 participants)

- **Question 1:** Existing and new development should be as "natural" as possible—not manicured. Lots that don't perk should remain undeveloped. Consider a community system for Wingaersheek, but not sewers. New development in this area should not include businesses.
- **Question 2:** Concerned about the salt marsh, shellfish, and bird life. Concerned about septic systems in impervious rock.
- **Question 3:** Sewers would increase the value of their property and make it easier to re-sell. However, sewers would impact other infrastructure such as the water system and schools.
- **Question 4:** Unhappy with the stringent Title V regulations and Gloucester Board of Health enforcement of them.

Other comments:

- Where does street water drain to? It shouldn't go into the marsh untreated.
- No massive removal or addition of materials to accommodate wastewater systems (blasting, earth removal, etc.)
- Make newer neighborhoods a lower priority for sewering; take care of critical areas first.
- I believe in private property rights. If development is not wanted, landowners should be compensated as though their property was taken by eminent domain.
- Concerned about the impact that sewers will have on other utilities – water, road, school.

GROUP #2 – Cedarwood Road, Fenley Road, Atlantic Ave. (11 participants)

- **Questions 1-4:** The recorder sheet for this group was not turned in. Individual comments are as follows:

Other comments:

- Growth and possible development; property values if sold.
- Cost to homeowners.
- We want sewer!!!
- Sidewalk on Concord Street.
- I think they should sewer the whole area.
- Designation and consideration of acquisition of open space land combined with provision for public access and wildlife preservation.
- Sewer appears to be the only viable option
- My neighborhood across from Stone Pier wants sewers – 114, 116, 118, 120 Atlantic Ave.
- Sewer is the best long term solution to protect Jones Creek and Annisquam and avoid future problems
- That homeowners don't lose the "sweat equity" they have built up in their homes. That retirees can sell their homes without losing all their equity replacing old systems so they can sell and afford to live. People are outraged at the cost of sewer in N. Gloucester – no one is outraged at the cost homeowners will face replacing systems in W. Gloucester.

GROUP #3 – Concord Street, Presson Point, Becker Lane (6 participants)

- **Question 1:** Village center desired with neighborhood breakfast store, to meet other people. West Parish School is a critical issue. Presson Point: maintain rural character and keep it clean.
- **Question 2:** "Environment is important to everyone in West Gloucester; that's why we live here." Would like to be able to swim in Little River.
- **Question 3:** Sewer or upgraded system would improve value of property. Title V system will cost more than sewer.
- **Question 4:** Other concerns include affordability of housing; capacity of West Parish School; and traffic that could be generated from redevelopment of the drive-in site.

Other comments:

- Please consider growth and the size of the West Parish School. Should the City be looking at expanding infrastructure to handle growth?
- Can the treatment plant handle possible new systems & Essex?
- Use a gravity flow system as much as possible.
- A village center, perhaps around Wellspring House.
- Sewer the West Parish School so it can grow to meet neighborhood need.
- Keep business off Concord Street.
- Let's start doing something and less discussing and meetings going nowhere.

GROUP #4 – Laurel Street, Kent Road, Little River Area (7 participants)

- **Question 1:** No radical changes. Don't increase density. If sewers are planned for this area, do other utilities at the same time – water and drainage.
- **Question 2:** Water quality is important. "We should be able to swim in our backyard." Also concerned about clamming areas.
- **Question 3:** Without sewers, people are unable to sell their house or must make expensive repairs.
- **Question 4:** Try to maintain existing character as much as possible.

Other comments:

- Provide public parking at trail entrances along Essex Ave. so people can enjoy access to the public open space we're preserving.
- Research the industries located in West Gloucester re: toxic and/or hazardous chemicals used in their facilities. Homeowners are not the only source of groundwater contamination.

GROUP #5 – Bray, Sumner and Overlook Streets (7 participants)

- **Question 1:** Positive changes could include sidewalks on Essex Ave. and new water and gas mains. Otherwise, avoid change as much as possible. Specifically, don't bring in businesses, increased traffic, or wider roads.
- **Question 2:** Concerned about well contamination, effect of pollution on Walker Creek, clamming beds, and reduction in alewife numbers.
- **Question 3:** Property value was not a main concern for the group. There are lots of failed septic systems in the area.
- **Question 4:** If only a few systems need to be fixed, then money should be pooled to fix the problems. Small lots/dense population areas must have sewers.

Other comments:

- 2 people stated that they would not even subdivide their land for their children.
- "I would replace my septic system if I knew it was polluting Walker Creek."
- Maintain stone walls, narrower roads, wildflowers and brush growth.
- Fernald Street is mostly self-maintained year-round.
- Install sidewalks and new water and gas mains while the roads are torn up.
- Stop all the land speculation going on in West Gloucester resulting from the sewer coming in.
- Cost is the main factor.

GROUP #6 – Concord St. to Essex Line, Walker Creek (8 participants)

- **Question 1:** Avoid new development and the increases in traffic that accompany it. Acquire more conservation land in the area.
- **Question 2:** Concern about shallow well contamination and stormwater runoff from increased development. Note that EPA may issue sewer edicts to clean up the Essex and Annisquam Rivers.
- **Question 3:** Currently, can't sell houses without costly septic upgrades. Gravity sewers increase value; unsure what alternative systems will do to property values.
- **Question 4:** Cost. Developing wastewater solutions to isolated properties without opening up open space to development.

Other comments:

- Concerned about effects of growth on increased stormwater and effect of stormwater discharge on creeks/shellfish flats (e.g., Walker Creek)
- Good statement of goals. Make sure there are good quality maps available throughout the process.
- Test the systems in our area: do we really need to be upgraded or changed?
- Be fair – help people who live here already.
- If this area is sewered, add deep water and fire hydrants.
- Prevention of profiteering/gouging by contractors/managers.

GROUP #7 – Walker Street (6 participants)

- **Question 1:** Preserve low density development pattern, narrow roads, stone walls, trees along roads. Overall, no change in the neighborhood character would be best.
- **Question 2:** Walker Creek is very important. It contains a relatively intact vegetative community and is actively shellfished. It should be fishable and swimmable in the future. Also, preserve woodlands and fields.
- **Question 3:** Sewer could increase property value but could also decrease value if it brings lots of growth. People live here for the quality of life.
- **Question 4:** School population, traffic, water pressure (no deep water on parts of Walker Street).

Other comments:

- If sewers are not recommended and regulators don't see the improvement statistics they want from the first round of upgrades, many more properties will be affected by second round of tests, making necessity for sewer greater next year.
- Maintain narrow roads. If sewered, post-construction should result in rebuilt stone walls and trees replaced.

3. Summary of Ballot Tabulations

At the end of the breakout groups, participants were asked to fill out the following ballot:

Instructions: On the left are five possible goals or priorities for West Gloucester to consider when planning for its wastewater treatment needs. However, these goals are sometimes in conflict with one another. Therefore, we ask that you rank each of them on a scale of 1-7 according to its importance to you (with 7 being the most important and 1 being the least important). You are allowed a total of 20 points to allocate among these five goals/priorities.

GOAL/PRIORITY	# OF POINTS (1-7)
Minimize wastewater treatment costs for homeowners.	
Preserve the character of your neighborhood (narrow roads, etc.).	
Preserve open space/prevent new development in your neighborhood.	
Prevent/mitigate wastewater-related environmental problems.	
Maximize residential property values.	
TOTAL	**20 PTS.**

Remember, the total of all the points added together must equal 20.

Tabulations of the ballot results for each of the breakout groups are provided on the following pages. Overall, participants ranked cost as the most important factor (average score of 4.8). Community character, open space, and environmental protection all ranked as relatively important (average score of 4.2 – 4.3). Property values were a less important factor overall, averaging a score of 2.5.

Certain neighborhoods ranked certain factors as particularly important. Specifically:

- The **Walker Street, Concord Street, and Walker Creek, and Laurel Street** areas were particularly concerned about **community character**.
- The **Wingaersheek Beach** area ranked **environmental protection** particularly highly.
- The **Cedarwood Road, Presson Point, Laurel Street, and Bray/Sumner/Overlook** areas all ranked cost as a very important factor.

West Gloucester Land Use & Wastewater Plan
Ballot Tabulations from November 2, 2000 Public Meeting

GROUP #1 - Wingaersheek Beach area															
QUESTION	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	AVG	Median	SD
Cost	5	6	7	3	4	3	4	3	4	4			**4.3**	**4.0**	1.34
Character	3	3	0	5	5	4	4	1	4	4			**3.3**	**4.0**	1.64
Open space	3	3	0	2	7	4	4	7	1	1			**3.2**	**3.0**	2.39
Environment	7	6	7	7	3	7	7	7	4	4			**5.9**	**7.0**	1.60
Property	2	2	6	3	1	2	1	2	7	7			**3.3**	**2.0**	2.41
SUM	20	20	20	20	20	20	20	20	20	20	0	0	20	20	

GROUP #2 - Cedarwood Road															
QUESTION	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	AVG	Median	SD
Cost	5	0	7	7	3	5	7	7	7	7	7		**5.6**	**7.0**	2.29
Character	3	1	1	2	7	1	1	2	2	7	3		**2.7**	**2.0**	2.24
Open space	3	5	5	6	7	1	7	4	2	3	3		**4.2**	**4.0**	1.99
Environment	5	7	4	3	2	7	1	4	2	2	3		**3.6**	**3.0**	2.01
Property	4	7	3	2	1	6	4	3	7	1	4		**3.8**	**4.0**	2.14
SUM	20	20	20	20	20	20	20	20	20	20	20	0	20	20	

GROUP #3 - Concord St., Presson Point, Becker															
QUESTION	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	AVG	Median	SD
Cost	3	4	7	5	5	7							**5.2**	**5.0**	1.60
Character	6	5	5	5	7	1							**4.8**	**5.0**	2.04
Open space	7	6	2	5	6	4							**5.0**	**5.5**	1.79
Environment	3	4	4	5	1	4							**3.5**	**4.0**	1.38
Property	1	1	2	0	1	4							**1.5**	**1.0**	1.38
SUM	20	20	20	20	20	20	0	0	0	0	0	0	20	20.5	

GROUP #4 - Laurel Street area															
QUESTION	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	AVG	Median	SD
Cost	5	5	1	5	7	7	7						**5.3**	**5.0**	2.14
Character	5	7	7	5	5	3	6						**5.4**	**5.0**	1.40
Open space	2	3	7	4	2	2	4						**3.4**	**3.0**	1.81
Environment	3	3	4	3	2	7	1						**3.3**	**3.0**	1.89
Property	5	2	1	3	4	1	2						**2.6**	**2.0**	1.51
SUM	20	20	20	20	20	20	20	0	0	0	0	0	20	18	

GROUP #5 - Bray, Sumner, Overlook															
QUESTION	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	AVG	Median	SD
Cost	4	7	4	1	6	6	7						**5.0**	**6.0**	2.16
Character	5	1	4	6	5	4	6						**4.4**	**5.0**	1.72
Open space	5	2	6	6	5	3	4						**4.4**	**5.0**	1.51
Environment	5	3	5	6	3	6	2						**4.3**	**5.0**	1.60
Property	1	7	1	1	1	1	1						**1.9**	**1.0**	2.27
SUM	20	20	20	20	20	20	20	0	0	0	0	0	20	22	

West Gloucester Land Use & Wastewater Plan
Ballot Tabulations from November 2, 2000 Public Meeting

GROUP #6 - Concord St toward Essex Line; Walker Creek															
QUESTION	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	AVG	Median	SD
Cost	1	7	1	7	3	1	3	7					**3.8**	**3.0**	2.82
Character	5	6	6	7	4	6	4	2					**5.0**	**5.5**	1.60
Open space	7	4	6	6	6	6	6	4					**5.6**	**6.0**	1.06
Environment	6	2	6	0	6	6	4	6					**4.5**	**6.0**	2.33
Property	1	1	1	0	1	1	3	1					**1.1**	**1.0**	0.83
SUM	20	20	20	20	20	20	20	20	0	0	0	0	20	21.5	

GROUP #7 - Walker Street															
QUESTION	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	AVG	Median	SD
Cost	3	5	7	2	7	4							**4.7**	**4.5**	2.07
Character	7	5	5	7	5	5							**5.7**	**5.0**	1.03
Open space	4	2	5	6	5	5							**4.5**	**5.0**	1.38
Environment	2	7	2	4	0	5							**3.3**	**3.0**	2.50
Property	4	1	1	1	3	1							**1.8**	**1.0**	1.33
SUM	20	20	20	20	20	20	0	0	0	0	0	0	20	18.5	

All Respondants															
QUESTION	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	AVG	Median	SD
Cost													**4.8**	**5.0**	
Character													**4.3**	**4.3**	
Open space													**4.3**	**4.4**	
Environment													**4.2**	**4.5**	
Property													**2.5**	**1.9**	
SUM	0	0	0	0	0	0	0	0	0	0	0	0	20	20	

West Gloucester Land Use & Wastewater Plan
Input from Public Meeting #2 – 11/15/00

1. Overview

After presentations by the consultant team, participants were randomly divided into five breakout groups of about 10 participants each. The breakout groups were asked to spend about 40 minutes discussing the following three questions:

1. **DEVELOPMENT DENSITY (15 min.)**
   - Do you support the concept of creating one or more "village" centers in West Gloucester? If so, where should they be located?
   - AND/OR: Do you support clustering of development in new subdivisions?
   - AND/OR: Do you prefer new residential development to be unclustered at lower densities (e.g. 1 lot per 1-2 acres)?

2. **ENVIRONMENTALLY-BASED DEVELOPMENT REGULATIONS (10 min.)**
   - Which natural or scenic features should be regulated, and why?
     (Examples: fish runs, scenic roads, building design/architecture)

3. **OPEN SPACE (15 min.)**
   - Should the City play a role in funding the protection and acquisition of open space in West Gloucester?
     (For example, by purchasing open space or providing tax incentives to landowners to keep their land undeveloped.)
   - Where, in your neighborhood, are special places you'd like to see conserved? (each participant should list up to 2 places, and indicate their location on the map)

A recorder in each group summarized the main points that were raised in response to each question.

2. Summary of Breakout Group Discussions

The following is a summary of each breakout group's response to each of the three questions.

GROUP #1/2

- **Question 1:** All 10 members of this group supported the concept of creating a village in West Gloucester. 7 of the 10 favored clustering/conservation subdivisions. Only 3 of the 10 felt that downzoning should be used.
- **Question 2:** Regulations should protect wetlands, wildlife habitat, shellfish, and fish runs. Also mature trees and historic homes/historic character (design standards). Rather than new regulations, perhaps there should be more oversight of current regulations.
- **Question 3:** 9 of the 10 group members felt that the City should buy open space. The question was raised whether reducing the amount of buildable land raises the cost of sewer for those who do pay.

GROUP #3/4

- **Question 1:** A village was suggested for the drive-in site and the immediate vicinity, but "only if done well." Other possibilities are along 133 east of Walker Creek. The group supported clustering; try to make open land accessible to the public. Concern about affordable housing and providing for West Gloucester's diverse economic groups.
- **Question 2:** Protect all of Walker Creek. Also scenic roads (Bray, Concord) and wildlife habitat.
- **Question 3:** City should play a role in protecting open space.

GROUP #5/6

- **Question 1:** The group is interested in a "Lanesville-type village" but worried that a village could become a strip mall. The group couldn't agree on a site – "not at the drive-in." Clustering is OK if open land is for the public; clusters help curb sprawl. Bigger lots should also be required.
- **Question 2:** The group did not support new regulations – would rather see development discouraged, perhaps through purchasing of open space or providing tax incentives for protection open space.
- **Question 3:** Yes, the City should buy open space. It's cheaper to pay for land now than to pay for services for new development later. If sewers are installed, land values (and tax revenue) will increase.

GROUP #7/8

- **Question 1:** The group supported the idea of a village off of Essex Avenue. "No street lights; have stores, trash stickers, video store." Clustering OK for large parcels – provide private wastewater disposal. Clustering: establish conservation subdivision regulations rather than existing Gloucester regulations (set aside most valuable land for natural resources; cluster homes on small lots away from busy roads; allow cluster by right). Some areas still must increase lot size to preserve open space. Don't require 40' wide roads for new development – they look silly.
- **Question 2:** Protect Walker Creek. Protect scenic roads (need Gloucester ordinance). Need new regulations for runoff. No committee to dictate architectural design. However, group members favor setback regulations to minimize visual impact of new "showcase" houses.
- **Question 3:** City should fund open space purchase. Provide tax incentives for open space & public access. Consider Community Preservation Act and transferring development rights.

GROUP #9/0

- **Question 1:** The group supported the idea of villages. Put them where infrastructure is – near West Gloucester Church – 128 at Concord St. Supportive of clustering, but make sure it's well-written so that open space is permanently protected.
- **Question 2:** Protection for salt marsh, Coffins Beach and dunes, Haskell Pond watershed, wildlife corridors. Make wetland buffers tighter. Concern about runoff from septic systems.
- **Question 3:** City purchase of open space should be a 2nd alternative to nonprofit involvement, which is preferable. Important that City-owned land be permanently protected. Lots of pressure to provide more public access to City-owned land.

OPEN SPACE PRIORITIES

In response to the second part of question #3, participants identified undeveloped parcels in West Gloucester that they felt should remain open space (i.e., should be priorities for open space protection). Suggestion included:

- Undeveloped parcels on S. side of 133 E. of Woodman
- Walker Creek watershed (2)
- Coastal wetlands
- Scenic road corridors: Concord from Bray to Lawrence Ct.; Bray
- Parcel N. of Becker Lane and W. of Fenley Road (2)
- Land between Walker and Concord Ct.
- Thompson Street (trail/path)
- Drive-in (2)
- Old church sites, Civil War training field
- Backside of Beechbrook Cemetery woods
- Farm Creek watershed
- Bald spots and scenic knolls (NE corner of 133 and Sumner; SW corner of Bray and Atlantic)
- Land W. of Lincoln Street
- Land N. of Causeway and E. of Atlantic
- YMCA camp (2)
- Land in ACEC
- Mount Ann – red rock mountain
- Parcels N. of 133 between Sumner and the cemetery
- Land around Old Thompson Road & Cemetery
- Open land between Sumner, Concord and Bray
- Wetlands between Concord Street and Essex Bay
- Open land between 133 and Concord

Appendix B

Buildout Scenario Calculations

West Gloucester Land Use and Wastewater Plan

Buildout By Area - 4 Scenarios

Scenario 1: Assumes that sewer is available throughout the study area and that all developable land can be built upon, irrespective of septic constraints. This would be the highest-growth scenario if the private sewer regulations were not modified.

Scenario 2: Assmes that sewer service is available in the SSAs and CSSAs (both City and Private), but not anywhere else. Outside of the sewered areas, a percentage of vacant land could be developed using septic systems. This scenario would require modifying the private sewer regulations to disallow private connections outside of the designated areas.

Scenario 3: Assmes that sewer service is available in the City SSAs and City CSSAs only. Outside of the City sewer areas, a percentage of vacant land could be developed using septic systems. This scenario would require modifying the private sewer regulations to disallow private connections outside of the designated areas.

Scenario 4: Assmes that no sewer service is available in the Study Area. This is a hypothetical scenario that was examined for comparison purposes to assess the net growth impact of scenarios 1, 2, and 3. Under this scenario, a percentage of vacant land could be developed using septic systems.

Total Study Area Summary

		Developable	Scenario 1: Full Buildout			Scenario 2: Sewer in Prim. & Sec.			Scenario 3: Sewer in Primary Only			Scenario 4: No Sewer		
Zoning District	**Total Acres**	**Acres**	**Formula**	**D.U.**	**C/I SF**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**
R-RB	1104.25	235.25	0.468	110		0.00	0	27	0.00	0	27	0.00	0	28
R-RA	1249.88	595.33	0.893	532		12.64	11	141	12.13	11	141	0.00	0	133
R-2	1325.61	336.36	1.742	586		98.84	172	276	43.31	75	203	0.00	0	146
R-2A	88.42	18.17	1.205	22		15.61	19	20	12.38	15	17	0.00	0	5
R-3	325.38	143.74	3.267	470		113.22	370	395	103.13	337	370	0.00	0	117
N-B	7.87	4.49	0.45		88,013									
E-B	52.48	15.58	0.45		305,399									
G-I	32.03	9.32	0.875		355,232									
Total	**4185.92**	**1358.24**		**1719**	**748,644**	**240.31**	**572**	**858**	**170.95**	**438**	**758**	**0.00**	**0**	**430**
Net Impact				**1289**				**429**			**328**			**0**

BY AREA

Essex Avenue

		Developable	Scenario 1: Full Buildout			Scenario 2: Sewer in Prim. & Sec.			Scenario 3: Sewer in Primary Only			Scenario 4: No Sewer		
Zoning District	**Total Acres**	**Acres**	**Formula**	**D.U.**	**C/I SF**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**
R-RA		3.52	0.893	3		0.51	0	1	0.00	0	1	0.00	0	1
R-2		43.85	1.742	76		27.67	48	55	6.99	12	28	0.00	0	19
R-2A		18.17	1.205	22		15.61	19	20	12.38	15	17	0.00	0	5
R-3		96.91	3.267	317		93.96	307	309	93.96	307	309	0.00	0	79
Total	**0**	**162.45**		**418**		**137.75**	**374**	**385**	**113.33**	**334**	**355**	**0.00**	**0**	**105**
Net Impact				**314**				**281**			**251**			**0**

Walker Street

		Developable	Scenario 1: Full Buildout			Scenario 2: Sewer in Prim. & Sec.			Scenario 3: Sewer in Primary Only			Scenario 4: No Sewer		
Zoning District	**Total Acres**	**Acres**	**Formula**	**D.U.**	**C/I SF**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**
R-RA		83.09	0.893	74		9.55	9	25	9.55	9	25	0.00	0	19
R-3		0.35	3.267	1		0.30	1	1	0.30	1	1	0.00	0	0
Total	**0**	**83.44**		**75**		**9.85**	**10**	**26**	**9.85**	**10**	**26**	**0.00**	**0**	**19**
Net Impact				**57**				**7**			**7**			**0**

Sumner/Overlook Area

		Developable	Scenario 1: Full Buildout			Scenario 2: Sewer in Prim. & Sec.			Scenario 3: Sewer in Primary Only			Scenario 4: No Sewer		
Zoning District	**Total Acres**	**Acres**	**Formula**	**D.U.**	**C/I SF**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**
R-RB		74.29	0.468	35		0.00	0	9	0.00	0	9	0.00	0	9
R-RA		103.94	0.893	93		2.06	2	25	2.06	2	25	0.00	0	23
R-3		13.53	3.267	44		8.87	29	33	8.87	29	33	0.00	0	11
Total	**0**	**191.76**		**172**		**10.93**	**31**	**66**	**10.93**	**31**	**66**	**0.00**	**0**	**43**
Net Impact				**129**				**23**			**23**			**0**

Southern End of Concord St.

		Developable	Scenario 1: Full Buildout			Scenario 2: Sewer in Prim. & Sec.			Scenario 3: Sewer in Primary Only			Scenario 4: No Sewer		
Zoning District	**Total Acres**	**Acres**	**Formula**	**D.U.**	**C/I SF**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**
R-2		36.36	1.742	63		20.20	35	42	9.43	16	28	0.00	0	16
Total	**0**	**36.36**		**63**		**20.20**	**35**	**42**	**9.43**	**16**	**28**	**0.00**	**0**	**16**
Net Impact				**48**				**26**			**12**			**0**

Middle of Concord St.

		Developable	Scenario 1: Full Buildout			Scenario 2: Sewer in Prim. & Sec.			Scenario 3: Sewer in Primary Only			Scenario 4: No Sewer		
Zoning District	**Total Acres**	**Acres**	**Formula**	**D.U.**	**C/I SF**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**
R-RA		42.02	0.893	38		0.31	0	10	0.31	0	10	0.00	0	9
R-2		114.63	1.742	200		40.35	70	103	16.53	29	72	0.00	0	50
Total	**0**	**156.65**		**237**		**40.66**	**71**	**112**	**16.84**	**29**	**81**	**0.00**	**0**	**59**
Net Impact				**178**				**53**			**22**			**0**

Atlantic Street

		Developable	Scenario 1: Full Buildout			Scenario 2: Sewer in Prim. & Sec.			Scenario 3: Sewer in Primary Only			Scenario 4: No Sewer		
Zoning District	**Total Acres**	**Acres**	**Formula**	**D.U.**	**C/I SF**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**
R-RA		56.41	0.893	50		0.21	0	13	0.21	0	13	0.00	0	13
R-2		114.13	1.742	199		10.36	18	63	10.36	18	63	0.00	0	50
Total	**0**	**170.54**		**249**		**10.57**	**18**	**76**	**10.57**	**18**	**76**	**0.00**	**0**	**62**
Net Impact				**187**				**14**			**14**			**0**

Rust Island

		Developable	Scenario 1: Full Buildout			Scenario 2: Sewer in Prim. & Sec.			Scenario 3: Sewer in Primary Only			Scenario 4: No Sewer		
Zoning District	**Total Acres**	**Acres**	**Formula**	**D.U.**	**C/I SF**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**
R-2		0.29	1.742	1		0.26	0	0	0.00	0	0	0.00	0	0
R-3		32.91	3.267	108		10.09	33	52	0.00	0	27	0.00	0	27
Total	**0**	**33.2**		**108**		**10.35**	**33**	**52**	**0.00**	**0**	**27**	**0.00**	**0**	**27**
Net Impact				**81**				**25**			**0**			**0**

The Beach

		Developable	Scenario 1: Full Buildout			Scenario 2: Sewer in Prim. & Sec.			Scenario 3: Sewer in Primary Only			Scenario 4: No Sewer		
Zoning District	**Total Acres**	**Acres**	**Formula**	**D.U.**	**C/I SF**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**
R-2		26.93	1.742	47		0.00	0	12	0.00	0	12	0.00	0	12
Total	**0**	**26.93**		**47**		**0.00**	**0**	**12**	**0.00**	**0**	**12**	**0.00**	**0**	**12**
Net Impact				**35**				**0**			**0**			**0**

Fernald and Bray Streets

		Developable	Scenario 1: Full Buildout			Scenario 2: Sewer in Prim. & Sec.			Scenario 3: Sewer in Primary Only			Scenario 4: No Sewer		
Zoning District	**Total Acres**	**Acres**	**Formula**	**D.U.**	**C/I SF**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**
R-RA		201.07	0.893	180		0.00	0	45	0.00	0	45	0.00	0	45
Total	**0**	**201.07**		**180**		**0.00**	**0**	**45**	**0.00**	**0**	**45**	**0.00**	**0**	**45**
Net Impact				**135**				**0**			**0**			**0**

Top of Concord Street

		Developable	Scenario 1: Full Buildout			Scenario 2: Sewer in Prim. & Sec.			Scenario 3: Sewer in Primary Only			Scenario 4: No Sewer		
Zoning District	**Total Acres**	**Acres**	**Formula**	**D.U.**	**C/I SF**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**	**Dev. Ac.**	**Sewered D.U.**	**Total D.U.**
R-RB		158.02	0.468	74		0.00	0	18	0.00	0	18	0.00	0	18
R-RA		105.28	0.893	94		0.00	0	24	0.00	0	24	0.00	0	24
Total	**0**	**263.3**		**168**		**0.00**	**0**	**42**	**0.00**	**0**	**42**	**0.00**	**0**	**42**
Net Impact				**126**				**0**			**0**			**0**

0.25 = Fraction of unsewered land that can be built upon using septic systems.